US EPA RECORDS CENTER REGION 5

Soil Report
Proposed Oak Park Village
St. Louis Park, Minnesota
by
Soil Testing Services of Minnesota, Inc.

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SOIL TESTING SERVICES OF MINNESOTA, INC.

2405 ANNAPOLIS LANE
MINNEAPOLIS, MINNESOTA 55441

SUITE 280 612-559-1900

September 8, 1977

Diversified Equities Corporation 600 Chamber of Commerce Building 15 South 5th Street Minneapolis, Minnesota 55402

Attention: Mr. Jon Dickerson

STS Job No. 90920-B

Re: Supplementary Subsurface Investigation for the Proposed Oak Park Village at the Southwest Corner of 32nd Street West and Louisiana Avenue in St. Louis Park, Minnesota.

Gentlemen:

In accordance with your written authorization received in our office on August 26, 1977, the above referenced subsurface investigation has been completed. Enclosed herein please find the results of this investigation, and the engineering soil report prepared for this project. Three (3) copies of this report have been sent to the above address; a single copy has been submitted to the Architect, Miller, Hansen, Westerbeck, & Bell; and a single copy has been submitted to the St. Louis Park Housing and Redevelopment Authority.

In summary, variable soil conditions were encountered within the project site. These soil conditions can generally be separated by area; thus, different foundation alternatives appear feasible and practical for various portions of the site. Each of these foundation alternatives is considered in this report.

Foundation Borings and Testing
 Environmental Testing and

Mr. Jon Dickerson September 8, 1977 Page two

If you have any questions regarding this report, or if we can be of further assistance to you, please do not hesitate to contact us.

Very truly yours,

SOIL TESTING SERVICES OF MINNESOTA, INC.

William C. Kwasny

Registered Professional Engineer, Minnesota

WCK/111

cc: Miller, Hansen, Westerbeck, Bell, Architects, Inc.

Attention: Mr. Ed Bell

cc: St. Louis Park Housing & Redevelopment Authority

Attention: Mr. William Thibault Executive Director

I HEREBY CERTIFY THAT THIS PLAN, SPECIFICATION, OR REPORT WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY REGISTERED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

DATED 9-8-77

REG. NO

INTRODUCTION

The supplementary subsurface investigation for the proposed Oak Park Village has been completed. A total of sixteen (16) additional borings, numbered boring 22 through boring 38, were performed at this site. The logs of these borings, along with a soil boring location diagram, are included with this report.

The original subsurface investigation report for this project was submitted to the St. Louis Park Housing & Redevelopment Authority on February 11, 1977. Subsequent to submittal of that report, the locations of the proposed housing units were rearranged on the site, thus requiring additional borings to determine soil conditions at the actual building locations. In addition to the boring location diagram, a chart is included in the Appendix of this report, giving the revised building numbers and finished floor slab grade within each individual building, and the boring numbers pertinent to the specific buildings.

Based on the latest plans, it is our understanding that all of the buildings will be two-stories in height, with the exception of building number 1, which will be three stories in height. All of the buildings will utilize a wood frame construction with architectural brick veneer strips at various locations on the building. We anticipate that the foundation loads under the load bearing wall should not exceed 3 to 4 kips per lineal foot, for both interior and exterior walls.

Several single-story garage structures are to be located in the northeast corner of the site, as well as on the south central portion of the site. We anticipate that relatively light foundation loads would be generated by these structures.

Paved parking and roadway areas will be provided on the northerly, easterly, and south central portions of the site. The parking lot pavements will be utilized primarily be light passenger vehicles, consisting of automobiles and pickup trucks. However, occasional heavy wheel loads will probably be imposed on pavements such as by delivery trucks and refuse collection vehicles.

The purpose of this report is to describe the soil and ground water conditions encountered in the borings; to analyze and evaluate the data obtained; and to present recommendations for feasible methods of foundation design and construction.

SUBSURFACE INVESTIGATION PROCEDURES

A total of sixteen (16) borings were drilled for this phase of the investigation. The general boring locations were chosen during a discussion between Mr. Gary Frana and the writer. The specific boring locations were chosen by the writer, based on a revised building layout plan received from the Architect. The borings were laid out in the field by the writer and another Project Engineer from the staff of Soil Testing Services of Minnesota, Inc. The base point used for this investigation was the northeast property corner. The borings were laid out using a transit and taping.

With the exception of borings 22 and 23, all of the borings were drilled with truck mounted drill rigs. Borings 22 and 23 were drilled with a rig mounted on a Bombardier all-terrain vehicle, since extremely heavy rain during the course of the field investigation caused the site to be extremely difficult to traverse with trucks.

Some of the borings were advanced to full depth using continuous flight augers, while other borings were advanced to the 8 to 15 foot depths with continuous flight augers. In those borings which were drilled to greater depths, the wash boring technique was employed, wherein the borehole is advanced by using rock bits and drilling fluid which consisted of Revert drilling mud. When the wash boring technique was employed, NX steel casing was used in the upper level of the boring, to prevent borehole cave in.

All soil samples were obtained utilizing the Split Barrel sampling procedure in accordance with ASTM D-1586-67. A copy of this ASTM Specification describing the manner in which the soil samples were obtained, is included in the Appendix of this report. Soil samples obtained in this manner were examined in the field, sealed in glass jars to prevent moisture loss, and returned to our laboratory for further examination and testing.

Ground water level observations were noted in the soil boreholes during and after completion of the drilling operations. In addition, six day water level readings were taken in all of the borings. These readings are indicated in the lower left corner

of the respective soil boring logs. A discussion of the ground water table conditions at this site is included in a later section of this report.

LABORATORY TESTING PROGRAM

The laboratory testing program consisted of determining the water content and unconfined compressive strength of cohesive and semi-cohesive soils recovered from the boreholes. The unconfined compressive strength was determined by means of the hand penetrometer test. The results of this type of test are indicated on the soil boring logs by means of an open circle with an asterisk. Water content test results are shown on the soil boring logs by means of a darkened circle. The Standard Penetration values obtained in the Split Barrel sampling are indicated on the soil boring logs by means of a crossed circle. These values can be used to give an indication of the in-place relative density of granular soils.

Upon completion of the laboratory testing program, each of the soil samples was thoroughly examined by an experienced Soil Engineer to determine the major and minor soil components, while also noting the color, degree of saturation, and any conspicuous lenses or seams found in the samples. The soils were then visually classified on the basis of texture and plasticity in accordance with the Unified Soil Classification System. The capitalized symbol in parentheses following the written soil description on the boring logs is the approximate group symbol according to this classification system. A chart describing the properties of the various groups under this classification system is included in the Appendix of this report.

Upon completion of the classification, the Engineer stratified the soils by type as shown on the soil boring logs. Please note that these stratification lines represent the approximate boundaries between soil types. The actual transition between soil types in-situ, may be gradual, in both the horizontal and vertical direction. The soil samples recovered in this investigation will be retained in our laboratory for a period of 60 days after the date of this report. If further instructions with respect to the disposition of these samples has not been received within this time,

the samples will be discarded.

SITE CONDITIONS

At the time of the supplementary subsurface investigation, the site of the proposed development was vacant. It is our understanding that some site grading had been performed between February of 1977, and August of 1977. This is reflected in grades that are somewhat changed from the previous elevation. That is, the site at the time of the supplementary subsurface investigation was on the order of 12 to 24 inches lower in some locations. In addition, it appears that random piles of fill which had been observed under the snow on the southeast portion of the site had been removed.

SOIL CONDITIONS

The specific soil conditions found in the borings are indicated on the respective boring logs. In summary, variable soil conditions were encountered throughout the site. Fill material was encountered at the ground surface in all of the borings. The fill material was found to be on the order of 2 feet in thickness in the northerly portion of the site, to as deep as 10 feet at borings 24, 28, and 37. Organic soils were found to underlie the fill within approximately the southerly 2/3 of the site. The organic soils range from highly compressible black peat, to black silt. The organic soils range from approximately 12 inches in thickness, to as much as 9 feet in thickness at the location of boring 37.

Underlying the fill materials and organic soils (where encountered), loose to medium dense granular soils, consisting of fine to coarse sand and gravel with lesser portions of silt, were encountered. These granular soils were generally noted to be brown and gray-brown in color in shallower depth ranges, and changed to predominantly gray colors with increasing depth. Some strata of soft to stiff cohesive soils consisting of gray brown and gray clayey silts and silty clays, were also encountered underlying the organic soils.

The predominant factor which emerges from the soil borings performed at this site, is that the soil conditions are variable. These conditions vary relatively rapidly in both the horizontal and vertical extent, over relatively short distances. Based on the previous history of this site, wherein a wood creosote treating plant was operating on the site, holds the fact that much of the creosote contaminating material has been dug out and replaced, and these conditions are not unusual.

GROUND WATER CONDITIONS

Water level observations were obtained in the boreholes during and immediately after completion of the drilling operations. In addition, water level readings were taken at an extended interval following completion of the boring operations.

Since relatively permeable granular soils were encountered over much of the site, the readings which were obtained should be generally indicative of the actual long-term hydrostatic ground water table. That is, in these types of soils, the ground water level usually comes to equilibrium relatively quickly. Based on these readings, it is estimated that the true hydrostatic ground water table was located at depths on the order of 15 feet below the existing ground surface at the time that the borings were performed. However, in some cases, shallower ground water level readings were obtained, such as in boring 37. We are of the opinion that the shallower water level readings, such as reflected in boring 37, are actually perched ground water table conditions. Perched ground water conditions are encountered when water infiltrating downward from the surface, or moving laterally across the site, is impeded or restricted from continued flow due to a strata of less permeable soils such as silty clays or clayey silts.

Based on the readings obtained, we estimate that the true hydrostatic ground water table at the time of the subsurface investigation was located at approximately elevation +178 to +179 at the northern end of the site, and within the range of elevation of approximately +172 to +176 towards the southerly end of the site. Thus, it appears that the ground water table slopes downward towards the south in the same

general direction as the ground surface elevations at the site, with a total difference in ground water table elevation on the order of 3 to 4 feet.

Please note that in the subsurface investigation of February, 1977, the ground water table was found to be highest at approximate elevation +175 at the north, to +172 at the south. Thus, it can be seen that the ground water table has risen since that time. This is not unexpected, since the ground water tables during the Winter of 1976 and Spring of 1977 reflected the abnormally low rainfall conditions occurring in Minnesota during 1976. An estimated rise of the ground water table on the order of 2 to 3 feet would have been predicted when normal rainfall patterns were to return. Since the normal average rainfall has occurred during 1977, it can be seen that this rise in the ground water table has indeed been observed. We anticipate that the hydrostatic ground water table would probably not rise severely in the future, and should not rise to such a degree as to effect performance of foundations for the proposed structure.

Continued fluctuations in the level of the ground water table should be anticipated throughout the years, depending upon variations in precipitation, evaporation, surface runoff, and infiltration. Artificial regulation of the ground water table can also occur by means of dewatering operations or pumping from deep wells.

Previous Investigation A previous subsurface investigation at this site had been performed by Soil Engineering Services, Inc., of Minneapolis, Minnesota in October, 1969. We have reviewed this report, including the logs of the borings which were performed for that investigation. Similar soil and ground water conditions were encountered in both phases of our subsurface investigation, when compared to this previous program. This previous investigation also revealed that the ground water table sloped downward to the southwest, in the general direction of the surface topography.

ANALYSIS AND RECOMMENDATIONS

The analysis and recommendations for each individual building are presented separately in this section of the report.

Building No. 1 This structure will be a three-story building, located at the south end of the project site. Finished first floor elevation will vary from +194.3 at the east end of the building, to +187.3 at the west end of the building. The existing grade at this building location at the time of our subsurface investigation, ranged from +189.2 at the east end, to +187.6 at the west end. The soil conditions in this building consisted of fill overlying organic soils in borings 31, 33, and 34. This fill is approximately 4 feet deep at boring 31, extending to approximately 9 feet at boring 34. The organic soils at boring 31 consisted of black silt to a depth of 6 feet, continuing to a black fibrous peat extending to 15 feet in boring 34. At boring 34, the organic soil overlies soft clays extending to a depth of approximately 24 feet. The ground water table in this area is at a depth of approximately 15 feet.

Because of the variable soil conditions in this building, we recommend that two types of foundations be used, in order to achieve the most economical foundation system. For approximately the eastern 3/4 of the building, a spread footing foundation could be used after removal of the existing fill and organic materials, and replacement with a select compacted backfill. In the westerly 1/4 of the building, which extends to the northwest, where the organic soils and underlying soft clay extends to significant depths below the ground water table, we recommend the use of a driven pile foundation, consisting of treated timber piles. We are of the opinion that a hybrid foundation of this type can be successfully designed and constructed, utilizing construction joints at the appropriate location in the building to allow for differential settlement between the two segments.

In that portion of the building to the east of boring 9, we recommend that the existing fill and underlying organic material, as well as any underlying soft clays or silts which are found, be excavated to the naturally-occurring granular soils.

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This overexcavation would thus extend to a depth of approximately 12 feet at boring 31, to as deep as approximately 15 feet at boring 33. Variations in the depth of overexcavation may occur between the borings. The overexcavation to remove the unsuitable soils should extend laterally beyond the outside edges of the footings, a depth equal to the depth of overexcavation below the bottom of the footings.

To backfill this overexcavation, a select granular material should be used. A recommended gradation for this material is included in the Appendix of this report. Because the ground water table may be encountered at or near the bottom of this excavation, we recommend that silty sand or uniformly graded fine sands or cohesive material not be used as backfill for at least the first 2 feet at the bottom of the excavation. The backfill should be placed in loose lifts no thicker than approximately 9 to 12 inches, and should be mechanically compacted to at least 95% of the maximum Modified Proctor Dry Density according to ASTM D-1557-70. Spread footing foundations and the floor slabs of the building could then be supported on this backfill.

Exterior spread footings and footings in unheated portions of the building should be maintained at least 4 feet below final grade, which will descend from east to west across the building location. At the east end of the building, we anticipate that the final exterior grade would be at approximately elevation +194, while at the westerly end of that segment to be built on spread footings, final exterior grade would be approximately +189. Thus, footings supported 4 feet below this grade would be founded within the range of elevation of +189 to +190 at the east end; to approximately +184 to +185 at the west end. Spread footing foundations supported within this range of elevation, on a select compacted granular backfill assiduously placed as described above, over an adequate subgrade of non-organic undisturbed granular soils, may be proportioned for a net allowable soil bearing pressure not to exceed 4000 pounds per square foot. The net allowable soil bearing pressure refers to that pressure which may be transmitted to the foundation soil in excess of the pressure due to the final minimum depth of overburden.

We recommend that a minimum footing width of at least 20 inches for continuous footings, and at least 30 inches for isolated column footings, be used in order to avoid excessively narrow footings. The factor of safety with respect to bearing for this design would be in excess of 3. Settlements which should occur to the building should be less than 1/2 inch, and differential settlement should be less than 1/2 this amount.

For the westerly portion of the building (in the area of borings 9 and 34), we recommend that a treated timber pile foundation be used. Based on the soil conditions encountered in boring 34, considering a pile with an 8 inch tip and 12 inch butt, we anticipate that the piles would have to be driven at least 20 to 25 feet into the medium dense granular soils underlying the soft silty clay, in order to achieve a design pile capacity of 20 tons per pile. Thus, pile lengths on the order of 45 to 50 feet may be required for this section of the building. The actual pile lengths may vary because of varying soil conditions between the boring locations. The piles should be designed using appropriate dynamic pile driving formula, and the pile construction should be inspected in the field by an experienced Foundation Engineer to ascertain that the piles are being driven to proper bearing. The pile design should take into account negative skin friction (downdrag) caused by future settlement of the existing fill and underlying compressible soils. This force may amount to as much as 10 kips per pile. Also, if pile groups are used, a foundation review should be made to determine if a pile capacity reduction is applicable.

With the use of the pile foundation, we recommend that a structural floor slab be incorporated in the building. The purpose of using a structural floor slab is to minimize differential settlement between the pile-founded building walls, and a floor slab supported over the compressible fill and organic materials. In addition, utility connections for lines installed within the fill material over the compressible organic soils, should be flexible at this end of the building in order to permit differential settlement without disturbing service.

Building No. 2 The soil conditions at building number 2 are reflected in borings 35, These soil conditions are somewhat similar to those conditions found in 36, and 37. building 1, in that for the southerly half of the building, the soil conditions consisted of silty sand and clay fill overlying compressible peat, to depths on the order of 12 to 14 feet. The soils underlying the organic soils and soft clay are medium dense sands. At the location of boring 37, the soils consisted of fill overlying peat, organic clay, and soft silty clay to a depth of approximately 25 feet. Thus, removal of compressible fill and organic soils and soft clays at this building would not be feasible at the location of boring 37, whereas it may be feasible at the location of boring 35 and 36. Because of the relatively short length of this building, we are of the opinion that the most suitable foundation design for this building would consist of driven treated timber piles. The pile design and floor slab design for this building should be the same as recommended for the westerly portion of building number 1. That is, the recommendations with respect to the type of pile and approxilength of pile needed to develop a 20 ton pile capacity, have been described above.

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Building No. 3 The soil conditions at the location of building number 3, are reflected in borings 26, 27, and 28. The soil conditions here consist of fill material overlying organic soils comprised of a black sandy silt and black organic peat. These soils extend to a depth of approximately 6 feet at boring 26; 13 feet at boring 27; and 15 feet in boring 28. Thus, we feel the most feasible foundation type for this building would be to overexcavate the existing fill and the underlying organic soils and soft silty clay and clayey silt, and then backfill the excavation with a select compacted granular material as described previously in this report. Lateral oversizing of the excavation, as described for building 1, should be followed. The subgrade over which the fill is placed would vary from a stiff brown silty clay as

found at boring 26; to medium dense silty sand in boring 27; to a stiff clayey silt at boring 28. After this select granular fill is placed and compacted as described in a previous section of this report, a spread footing foundation could be used.

The exterior finish grade around this building would be on the order of +191 to +192. Therefore, footings supported at 4 feet below final grade would be founded within the range of elevation of +186 to +187. These footings should be supported on select compacted granular backfill. These footings may also be proportioned for a net allowable soil bearing pressure not to exceed 4000 pounds per square foot.

Settlement which may occur to this structure should be less than 1/2 inch and differential settlement should be less than 1/2 this amount. Again, the factor of safety with respect to bearing would be in excess of 3. The same limitations on minimum footing widths would apply to this building, as recommended previously in this report.

The soil conditions in this building are shown in borings 24 and 25. At this building, the soil conditions consist of fill to a depth of approximately 10.5 feet at boring 24, and fill extending to a depth of approximately 8 feet at boring At boring 24, the fill overlies a 2 feet thick stratum of black silty fine sand in a very dense condition, containing only a trace of organic material. There was no organic soil found below the fill in boring 25, although the fill itself is loose. Thus, for this building, we recommend that a spread footing foundation supported at normal frost depth be used, with the following qualifications. The first qualification would be that a very careful inspection of the foundation excavation be carried out at this building, consisting of an experienced Foundation Engineer performing hand auger borings approximately every 20 to 30 feet of length along the bottom of footings. The purpose of this detailed inspection is that variable soil conditions, including buried organic soils, were found in other portions of the site, and buried organic soils may occur between the locations of boring 24 and 25 that could not be found in the borings themselves. This inspection should also include compaction testing of the fill material at footing depth, by using a sand cone test or a nuclear density

meter, in order to determine the density of the soil within 3 feet from the bottom of footings. At the location of boring 25, the existing fine sand fill was in a medium dense condition, while the silt at boring 25 was found to be loose. Other zones of this loose fill material may also exist. For the use of bearing pressure no greater than 3000 pounds per square foot for this building, we recommend that the existing fill be recompacted in-place to at least 93% of the maximum Modified Proctor Dry Density, to a depth of at least 36 inches below the bottom of footings.

We would anticipate that spread footing foundations at this structure would be supported within the range of elevation of +186 to +187. Footings at this depth thus, would be found on existing granular fill consisting of brown fine sand, silty fine sand or silt. For maximum bearing pressure given above, on the soil encountered in these borings, we anticipate that total settlement of the structure may be on the order of 1/2 to 3/4 inch, with differential settlement being on the order of 1/2 this amount. The factor of safety with respect to bearing for this design, should be in excess of 3.

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: 1 Building No. 5 The soil conditions at this building are described in borings 22 and 23. The soil conditions consist of approximately 2 feet of dark brown silty fine sand fill at the surface. Underlying the fill material was a medium dense, naturally-occuring, granular soil consisting of brown fine sand, yellow-brown silty sand, and brown fine to coarse sand.

The finished first floor grade for this building will be +198.6. Thus, approximately 4 to 5 feet of fill will be placed around this building to achieve final grade. We recommend the use of a spread footing foundation for this building. The spread footings should be supported at least 4 feet below final grade, and would be founded within the range of elevation of +193 to +194, or at approximately the grade existing at the time of the subsurface investigation. Thus, a first recommendation prior to the placement of any fill around this building, is to compact the existing surface soil, since the non-organic granular fill at the location of boring 22

was found to be loose within the upper zone. The fill material should be compacted to at least 95% of the maximum Modified Proctor Dry Density. Spread footing foundations supported on this material, or over the existing granular fill material having a Standard Penetration value of at least 10 blows per foot, may be proportioned for a net allowable soil bearing pressure not to exceed 4000 pounds per square foot.

Fill material within the building and under the floor slab, not intended to support interior bearing walls, would only have to be compacted to 90% of the maximum Modified Proctor Dry Density, for floor loads which would not exceed 300 pounds per square foot. Exterior fill around the building should be compacted to at least 85% of the maximum Modified Proctor Dry Density, to minimize post construction settlements.

The factor of safety with respect to design of the foundations for building 5 should be in excess of 3. Settlement which may be expected should be less than 1/2 inch and differential settlement should be less than 1/2 this amount.

Building No. 6 No boring was drilled at this specific building. The soil conditions for this structure are extrapolated from those found at borings 22, 4, and 16 (phase I investigation).

The finished first floor elevation for building 6 would be +195.7. Thus, since we recommend the use of a spread footing foundation for this building, footings supported 4 feet below final grade should be founded within the range of elevation of +190 to +191. These footings would probably be supported on naturally-occuring, non-organic, medium dense granular soils. As recommended for building 5, spread footings for building 6 should be proportioned for a net allowable soil bearing pressure not to exceed 4000 pounds per square foot, based on foundation subsoils consisting of naturally-occuring, non-organic, granular soils having a Standard Penetration value of at least 10 blows per foot. The factor of safety with respect to bearing for this design should be in excess of 3, and settlements should not exceed 1/2 inch.

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Building No. 7 and 8 The soil conditions at the two buildings are defined by borings 1 and 2 of the original investigation. Finished first floor elevation for building 7 would be approximately +197; while for building 8, this elevation would be approximately +195. Thus, exterior finished grade would vary from approximately +196 in building 7, to +194 at building 8. Footings supported at frost depth at building 7 would be founded within the range of elevation of +191 to +192; and the footings would be founded at +190 to +191 for building 8. Based on borings 1 and 2, we anticipate that these footings would be supported on naturally-occuring, non-organic, medium dense granular soil. Spread footing foundations for these two buildings, supported on the soils described above, within the ranges of elevation given above, may also be proportioned for a net allowable soil bearing pressure not to exceed 4000 pounds per square foot.

Regarding the design of floor slabs for this building, please note that some buried organic topsoil was encountered near the surface at the location of boring 1. We recommend that any organic topsoils under the floor slabs of these buildings be removed and replaced with a select compacted granular backfill. This backfill should be compacted to at least 90% of the maximum Modified Proctor Dry Density.

Building No. 9 The soil conditions at this building are described by boring 13 of the original investigation. This boring, which was drilled for a proposed parking area at the time, extended to a depth of 11.5 feet and disclosed approximately 3 feet of fill over medium dense naturally-occuring granular soil. Finished grade for this building would be +193.7. This is approximately the grade existing in this area at the time of the subsurface investigation. We do recommend the use of spread footing foundations for this building, supported at least 4 feet below final grade. Thus, the footings would be founded within the range of elevation of approximately +188 to +189, and should be supported on naturally-occuring, non-organic medium dense granular soils. Spread footings for this building, supported at normal frost depth on the soils described above, may be proportioned for a net allowable soil bearing pressure

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not to exceed 4000 pounds per square foot. The factor of safety with respect to bearing for this design would be in excess of 3, and settlements which may occur to this structure should be less than 1/2 inch in both differential and total settlements

The floor slab for this building may be cast directly on the non-organic granular fill soils which were found at the location of boring 38 or 13.

Building No. 10 The soil conditions at this building are described by boring 12 of the original investigation, which was performed for a proposed parking pavement; and by boring 38 of the phase II investigation, which was extended to greater depth.

Boring 38 disclosed fill material existing to approximately 4 feet, consisting of medium dense silty sand and brown fine sand. Underlying the fill material was naturally-occuring, medium dense granular soil, changing to a stiff gray-brown clayey silt at a depth of approximately 19 feet.

We recommend the use of a spread footing foundation for building 10. The spread footings should be supported at least 4 feet below final grade, and thus would likely be founded within the range of elevation of +188 to +189. The footings at this elevation would likely be supported on naturally-occuring, non-organic, well-graded brown sand. These spread footings may also be proportioned for a net allowable soil bearing pressure not to exceed 4000 pounds per square foot. The factor of safety with respect to bearing for this design would be in excess of 3, and total differential settlements for this building should not exceed approximately 1/2 inch.

No excavation

Garage No. 2 The soil conditions at garage number 2 are described in borings 29 and 30. These soil conditions consist of medium dense to loose sand and clay fill to depths on the order of 6 feet. In boring 29, the fill was underlain by stiff gray-brown and gray silty clay; while at boring 30, the fill material was underlain by soft to stiff black silty clay containing a trace of organic matter. This black silty clay was found to have a relatively low moisture content, and therefore, we anticipate that it would not be extremely compressible. Since the proposed structure

at this location is to be a lightly loaded frame garage, with a slab-on-grade at approximately elevation +190.3, we are of the opinion that the building could be successfully supported on spread footing foundations, without having to remove all of the black silty clay. A slight amount of fill, on the order of 12 inches in thickness, would have to be placed in this area to raise the grade to final elevation.

The footings for this building should be supported at least 4 feet below final grade, and would likely be found within the range of elevation of +185 to +186. These footings would be supported on the existing brown fine to coarse sand at boring 29, or on the clay fill at boring 30. These footings may be proportioned for a net allowable soil bearing pressure not to exceed 1500 pounds per square foot. Total settlement which may occur to this structure may be 3/4 to 1 inch, while differential settlement should be less than 1/2 this amount. However, as mentioned above, we are of the opinion that the proposed building for this location should be able to tolerate this type of settlement. If it is decided that this amount of settlement is undesireable, we recommend that the footings be extended deeper, through the black silty clays found at boring 30, to bear on the underlying non-organic soils encountered at about 6 feet.

The floor slab for this building should not experience detrimental settlements due to consolidation of the existing fill. The amount of load which the floor slab would add to the existing fill should not be excessive. However, we do recommend that appropriate construction joints be cast into the slab so that differential settlement does not cause random cracking.

Pavement Areas For the design and construction of pavements, the recommendations contained in this report for floor slabs on grade, regarding removal of existing fill, underlying topsoil and organic soils, inspection, placement of new fill and compaction are applicable. In addition, however, we recommend that any subgrade fill material placed for exterior pavements be a select granular soil having less than 8% passing a number 200 sieve. A recommended gradation for this material is included in the

Appendix of this report. In areas where heavy wheel loads are anticipated, we recommend that the subgrade fill material be compacted to a minimum of 95% of the maximum dry density according to ASTM D-1557-70.

In the southern parking lot area, some post-construction settlement of the pavements can be anticipated, due to the presence of the compressible organic soil which underlies the area. It is probably the most economical choice to leave these materials in place. This settlement will occur due to the weight of additional fill to be placed in this area, and other loads which may be imposed upon the pavement. This settlement may amount to a few inches and could be expected to occur over a period of several years. It is likely that maintenance consisting of patching and releveling the pavements through the years will be less expensive than completely overexcavating the unsuitable underlying soils and replacing with a properly compacted fill in order to avoid settlement.

One major problem which may occur related to the settlement of the parking lot would be that if storm sewer lines are incorporated into the design in order to drain the pavements, these lines may become damaged or broken due to settlement and thus cause larger maintenance and repair costs to develop. It may be more beneficial to properly slope the parking lot in order to avoid such problems. In addition, manholes should be supported on non-compressible soils below the organics. The pavement should be properly graded to maintain positive flow into the manholes.

We would be pleased to be of further service to you in providing additional recommendations for the design of the project pavements if furnished with more specific information regarding loading, usage, and frequency of load application. As a general recommendation, we are of the opinion that a bituminous pavement is the most feasible. However, we recommend the use of rigid concrete pavement for the garage floors and aprons. In any event, we recommend that the design of the project pavements incorporate facilities for proper drainage. Where standing water develops on the pavement surface, or within a base course layer, softening of the subgrade due to freeze/thaw conditions and general deterioration of the pavement can be expected.

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POTENTIAL CONSTRUCTION PROBLEMS

We anticipate that the ground water table may be encountered in excavations extending to depths on the order of 15 feet below the existing grade, during removal of unsuitable soils. However, we are of the opinion that the amount of water should not be extreme, and that water which would seep in from the ground water table, from perched ground water conditions, or from surface runoff in the area, can be removed by means of standard sump pit and pump operations. We do recommend that any water standing on foundation soils or on a subgrade over which additional fill is to be placed, be removed as soon as possible to prevent softening of the soil. Any soils which are loosened or disturbed during the excavation, should be recompacted to at least the initial density prior to placement of any fill or foundation construction. Furthermore, concrete for footings should not be placed directly into standing water. Rather, such water should be removed prior to concrete placement.

In the design of the project, care should be exercised at the location of the utility lines which connect the buildings with the municipal systems. The location of the lines in some areas may be underlain by compressible organic soils. Routing of lines through this area should be avoided if possible. The reason for this is to minimize differential settlement which may occur between the structures and utility lines. Such settlement could result in distress to the lines and interuption of service. If the lines are routed through organic soils in some areas, it may be necessary to support the lines on piles, in which case the settlement of the lines would not be anticipated. However, where pile-supported utility lines may go under paved parking areas where settlement may occur, this may result in bumps or high spots in the paved area.

We recommend that areas to be paved be test rolled, in accordance with Minnesota Highway Specification Section 2111, to detect areas of loose or unstable soil. Where test rolling is used for paved areas, care should be exercised to avoid the use of construction equipment which is excessively heavy. Where excessively heavy equipment

is used, this may cause undue disturbance of the subgrade, especially if the subgrade is saturated at the time of the test rolling. In any event, we recommend that all of the test rolling be observed by an experienced Soil Engineer in order to evaluate the results of the test rolling procedures.

Sidewalls of excavations for this project must be either adequately sloped, or sheeted and braced, in accordance with pertinent OSHA Regulations in order to provide safe working conditions for personnel in the excavations. It is the responsibility solely of the Contractor to comply with such regulations as they pertain to foundation construction and earthwork operations for this site. Excavation to, into, and through buried organic soils at this site must be properly vented, to prevent possible buildup of toxic, noxious, or flammable gases which may occur due to anaerobic decomposition of the buried organic soils. Extreme caution should be exercised if personnel are to enter narrow trenches for work, to prevent them from being overcome by such gases.

During exterior paving operations, we recommend that the final placement of the bituminous materials be accomplished only when the subgrade and base course are within the optimal range of moisture content. That is, we recommend that if subgrade is prepared, and becomes saturated and/or weakened due to rainfall or freeze/thaw conditions prior to placement of the bituminous wearing surface, the paving should be delayed until such time as the subgrade strength is restored.

GENERAL QUALIFICATIONS

This report has been prepared based on information received from the Owner, St. Louis Park Housing & Redevelopment Authority; and the Architect, Miller, Hansen, Westerbeck, Bell, as well as on the soil and ground water conditions revealed in the two phases of the subsurface exploration performed at this site. The purpose of this report is to aid in the evaluation of the soil and ground water conditions at this site, and to assist the Architect and Owner in the design of the project based on our understanding of the project requirements. If there are any changes in the size, scope, elevations, structural loads, use or nature of the proposed buildings, from

those conditions stated in this report, we ask that we be advised of these changes as soon as possible in order that we may have the opportunity to review our recommendations and determine if they remain applicable.

As noted in the soil borings and as described in the text of this report, buried layers of organic soil, consisting of topsoil, peat, organic clay, and soft silty clay layers were encountered at this site. We definitely recommend that spread footing foundations not be supported over these soils, or over additional fill placed over these soils. Rather, deep foundations are recommended for these areas; or alternatively, overexcavation of organic soils and soft soils, and replacement with a properly compacted backfill should be used where feasible.

We urge that all foundation construction and site preparation work at this project be inspected by an experienced Soil Engineer to ascertain that the soil conditions at and below the foundations are as anticipated in this report. This is especially true in areas where buried organic soils were not disclosed, yet where the possibility of these organic soils existing is known.

Where compacted backfill is utilized under pavements, floor slabs, or footings, we strongly recommend that testing of the in-place density of the fill be made at the time of construction. This would include having a Soil Engineer or Soil Technician perform in-place field density tests. The satisfactory performance of structures and pavements supported over compacted fill is dependent upon placement of the fill over a suitable subgrade of non-organic, undisturbed, non-compressible soil. Furthermore, the fill materials must be compacted in a uniform manner to the minimum densities recommended in this report.

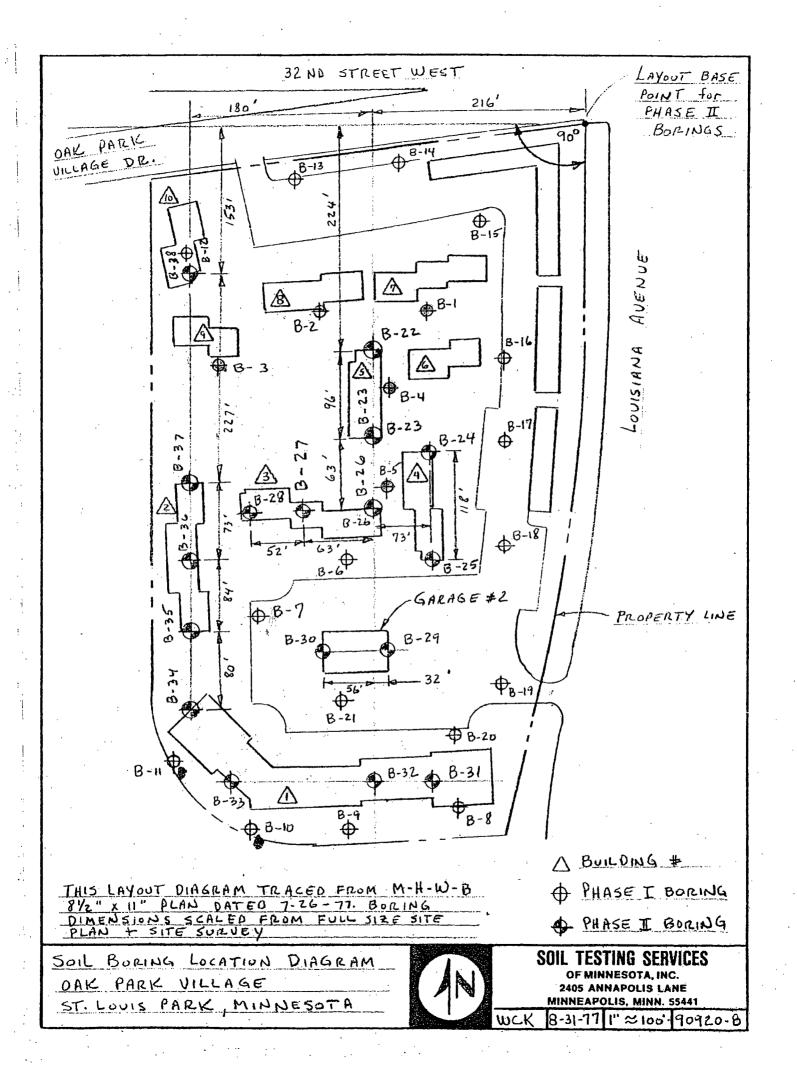
The soil and ground water conditions at this site have been determined at a total of thirty-eight (38) soil boring locations. The soil and ground water conditions described herein, are pertinent only at the soil boring locations, and under the environmental conditions existing at the time of the subsurface exploration. Variations including some extreme variations, were noted in the soil conditions at different borings. Further variations may exist which could not be detected at the soil borings

OIL TESTING SERVICES OF MINNESOTA, INC

or during the site inspection by the writer. Further, we cannot predict future environmental changes which may occur at this site, such as construction of adjacent foundations, possible spillage of chemicals which may attack the soil, artificially regulated lowering or raising of the ground water table and so on. Therefore, no other warranty, either expressed or implied, is presented in this report with respect to the soil and ground water conditions at this site.

APPENDIX

- 1. Soil Boring Location Diagram
- 2. Summary of Building Finished Floor Grades
- 3. General Notes
- 4. Soil Boring Logs
- 5. ASTM Specification D-1586-67
- 6. Unified Soil Classification Chart
- Recommended Gradation for Select Granular Backfill Under Structures and Pavements



STS Job No. 90920-B Oak Park Village St. Louis Park, Minnesota

SUMMARY OF BUILDING FINISHED FLOOR GRADES & BORING LOCATIONS

Building No.	Pertinent Borings	Finished Floor Slab Grade
1	8, 9, 10, 11, 31 32, 33, 34	+194.3 (east end) +187.3 (west end)
2	35, 36, 37	+189.7 (north end) +188.3 (south end)
3	5, 6, 26, 27, 28	+192.7 (east end) +191.3 (west end)
4	5, 24, 25	+193.7
5	4, 22, 23	+198.6
6	16, 22	+195.7
7	1	+196.7 (west end) +197.3 (east end)
8	2	+195.0 (west end) +195.6 (east end)
9	13	+193.7
10	12, 38	+194.66
Garage #2	29, 30	+190.3
Garages in N.E. Corner	14, 15, 16, 17, 18	+199.0

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

Split Spoon - 1.3/8" I.D., 2" O.D., unless Osterberg Sampler - 3" Shelby Tube otherwise noted HS Hollow Stem Auger Shelby Tube - 2" O.D., unless otherwise noted ws Wash Sample Power Auger FT Fish Trail DB Diamond Bit - NX: BX: AX RB Rock Bit Auger Sample BS **Bulk Sample** PM Jar Sample Pressuremeter test - in situ

vs Vane Shear Standard "N" Penetration:

Blows per foot of a 140 pound hammer falling 30 inches on a 2 inch OD split spoon, except

where noted.

WATER LEVEL MEASUREMENT SYMBOLS:

WL Water Levei WCI Wet Cave In DCI Dry Cave In WS WD While Sampling While Drilling BCR:

Before Casing Removal After Casing Removal ACR .

AB :. After Boring

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. In pervious soils, the indicated elevations are considered reliable ground water levels. In impervious soils, the accurate determination of ground water elevations is not possible in even several days observation, and additional evidence of ground water elevations must be sought.

GRADATION DESCRIPTION & TERMINOLOGY:

Coarse Grained or Granular Soils have more than 50% of their dry weight retained on a #200 sieve; they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays or clayey silts if they are cohesive, and silts if they are non-cohesive. In addition to gradation, granular soils are defined on the basis of their relative in place density and fine grained soils on the basis of their strength or consistency, and their plasticity.

Major Component Of Sample	Size Range	Descriptive Term(s) (Of Components Also Present in Sample)	Percent of Dry Weight
Boulders	Over 8 in. (200mm)	Trace	1 – 9
Cobbles	8 in. to 3 in. (200mm to 75mm)	Little	10 — 19
Gravel	3 in, to #4 sieve (75mm to 2mm)	Some	20 — 34
Sand	#4 to #200 sieve (2mm to .074mm)	And	35 – 50
Silt	Passing #200 sieve (0.074mm to 0.005mm)		
Clay	Smaller than 0.005mm		•

CONSISTENCY OF COHESIVE SOILS:

RELATIVE DENSITY OF GRANULAR SOILS:

Unconfined Comp. Strength, Qu, tsf	Consistency	N - Blows/ft.	Relative Density
< 0.25	Very Soft	0 - 3	Very Loose
0.25 - 0.49	Soft	4 – 9	Loose
0.50 - 0.99	Medium (Firm)	. 10 – 29	Medium Dense
. 1.00 - 1.99	Stiff	30 – 49	Dense
2.00 - 3.99	Very Stiff	50 - 80	Very Dense
4.00 - 8.00	Hard	80+	
>0.00	Vary Hard		

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\bowtie		_	 		Dark brown sil		ium sand	ļ	1	0 2	0 :	30 <u>4</u>	0 5	0	
	1	РА	lli		fill - moist -						'				
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5.0	2	SS	Ш		·			<u> </u>		'		کر ا	b '		
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	3	ss				• .			l		24	1			
					Brown fine to o gravel & silt -				1		12			ĺ	
	7.	ss	II		medium dense -		C (O)				}	30	1		
10.0	-	33	Ш		·						/	7			
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15.0	5	ss	Ш	Ш						\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	1			'	
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		_	-							7		1			
20.0		-	Ш		Gray fine to co	parse sand, tra	ace		ہے 8	{					
	<u>Б</u>	SS	Ш	"	gravel & silt ·	- satureted -	loose	,	8						
	1				to medium dense	e - (SW) - str	ong		۱ ۱				.	<u>.</u>	
	-				creosote odor			l .		\					
	}	İ													
25.0			L							\					
	7	SS	$\ \ $	Щ	•					168					
26.5	 	٦	Ш	H	·					- 0	 	 		-	
					End of Boring										
	į	İ			·				· .		1	•			
					Hollow stem aug	ger casing used	d full						. !	1	
					depth.	:									
	•														
			L	Ш			<u> </u>	L		<u> </u>	<u> </u>				
					OBSERVATIONS	0011		,				-26-7			
W.L.		.01			17 Q1 ACD	SOIL TESTIN		ES	BORIN RIG B		APLETE	D 1-2	6-77 IAN HH		
	W.L. 19.0'B.C.R. 17.8' A.C.R. W.L. WCI 18.0' A.C.R.					OF MINNES 2405 ANNAP	•	.	DRAW				NED 10		
					5 days AB	MINNEAPOLIS	, MINN. 5544	1		+ 909	20				
 	טע	1 1	1.		J udys AB	The stratifica	ation lines	renro				SHEET		rv	
						between soil	types and	the 1	transit	ion ma	ay be	gradua	al.	· J	
DOCATES	<u>-</u>					 	····								

						LOG OF BORI								-
OWNE							ARCHITECT-ENGINEER Miller, Hanson,							
					ark Housing Autl		Westerbeck, Bell - Architects, Inc. PROJECT NAME							
SITE	-				eet West & Louis		Oak Park Village							
}	31	. L	-OI	. I L	s Park, Minneso	La	uak Pari	K VII		FINED C	OMPRESS	IVE STRE	NGTH TO	NS/FT?
}								}				O		
NO	Š.	금	IST		DESCRIPT	ION OF MATERIAL		×κ	l —	1	2	3 '		5
HA.	и	ΑÄ	Ш	EB	525,5111			RO.		STIC IT %		ATER FENT %		UID T %
DEPTH ELEVATION	SAMPLE	Щ	ΜP	S				UNIT DRY WT LBS./FJ. 3			(9 — — -		$-\Delta$
234	SAI	TYPE SAMPLE	SA	끮	SURFACE ELEVATION	193.2		5	<u> </u>		(ETRATION		5/FI.)
\bowtie		<u> </u>			Black silty or		coil -		<u> </u>	0 :	20 ;	30 <u>4</u>	0 <u> </u>	0
	1	PA	Ш	Щ	moist - frozen		3011							
	2	SS			Brown silty cla frozen - (CL)	ay, trace sand	- stiff	-		b *	3			
		PA	Ш		Black & dark b		ghtly					 	<u> </u>	
5.0	3	ss			organic sand f	ill - moist - i				8 8€				
		PA	ا```	-	dense - (OL-SM Brown fine to m) modium sand t	*260	<u> </u>			ļ	<u> </u>		
					coarse sand, to				2	1				
	4	SS	Ш	Щ	very loose - (\aleph \sim	ļ				
			h	П	·			<u></u>	-	13			ļ	
10.0	5	ss		Щ	•			}	}	8				
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15.0	6	SS	Ш		•				٠,	Li				
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20.0	7	ss						· .		\&\				
					Brown fine to			}						
					to gray at 20									
					gravel & silt below 20 feet	- moist to way - medium dense	- (SW)	•						
25.0			П		creosote odor					Lu				
25.0	8	SS	Ш						l `		ŀ			
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		<u> </u>									İ			
30.0	9	SS	П				·			Q ¹²				
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	WATER LEVEL OBSERVATIONS					ext page)				<u> </u>	<u> </u>	<u> </u>		
W.L.					OBSERVATIONS		A APRILLA	_				-27-7		
W.L. 19.0' WS W.L. 19.0' B.C.R. 17.3' A.C.R.				_	17.31 ACR.	SOIL TESTIN OF MINNES		t9				D 1-2		
W.L. WCI 17.5' A.C.R.						2405 ANNAP	OLIS LANE		RIG B-50 DRAWN JO			FOREMANHH APPROVED JO		
DCI 16.2' 4 days AB					4 days AB	MINNEAPOLIS,	APOLIS, MINN. 55441		JOB # 90920		20	SHEET		
							ation lines		sent 1	the ap	proxir	nate b		ry
		``				between soil								
BBS4157	Б.				***									•

	LOG OF BORING NO. B-5 (page 2 of 2)														
OWNE							ARCHITECT-ENGINEER Miller, Hanson, Westerbeck, Bell - Architects, Inc.								
					ark Housing Auth					- Arc	hitec	ts, I	nc.		
SHE	32n	d S	ţ	re	et West & Louisi	iana Avenue	PROJECT						•	.	
ļ	St.	LC	ou T	IS	Park, Minnesota		Oak Park Village UNCONFINED COMPRESSIVE STRENGTH TONS/F						MS/FT 3		
					• .			<u>.</u> :							
2	NO.	닐	IST.		DESCRIPT	ION OF MATERIAL		≱ო	 	1	2	3 4	4 	5 	
T A T	Z	SAMPLE		EΒY	DESCRIPT	ION OF MATERIAL		된		STIC IT %		TER ENT %		UID T %	
DEPTH ELEVATION	SAMPLE	m so	APL	RECOVER	(continued from	m previous pag	e)	UNIT DRY WT	X-			<u> </u>			
1 _1	SAN	TYPE	SA	RECOV		<u> </u>	⊗					(BLOWS			
3 d .0			L	Н	SURFACE ELEVATION		L	_	11	0,12 2	20 3	0 4	0 5	0	
					Brown fine to o to gray at 20 f	-					·				
					gravel & silt										
					below 20 feet			-					}		
	<u> </u>	-	Ш		creosote odor	19 feet to 30	feet		 		-*/	30			
35.0	10	ss	Ш	Ш							OS	P~ .			
					·				1		1				
					Brown-gray & si				<u> </u>						
	10 <i>F</i>	РΔ	$\parallel \parallel$		trace silt - sa dense - (SM-SP)		i um		1						
40.0			Hì		(9.1. 0.1	,			1		1 /2	<u> </u> 			
40.0	11	SS	Ш						Ì		×		1		
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										7					
45.0									ļ	Ø14					
	12	55	Ш	$\left \cdot \right $	Gray-brown fine	e coarse sand,	trace		1	17					
					silt - saturate				1						
			l		(SW)				1	\					
						•			İ	\	20				
50.0	13	ss								6	\flat^{20}				
		· .	Γ		End of Boring										
					~ ·				İ	Ì					
					34" ID Hollow		ing		1						
			l		used full depti	h.			1						
					Drilling mud u	sed after samn	ling at						•		
					20 foot depth.		g a c			•					
	. •				·] .		
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									1						
Calibrated Penetrome													} :		
					→ Calibrated	renetrometer			2.4						
T	ATER)		G STAR		-27-7	7		
W.L.	WI 10 01 - 00 1 47 01 100						G SERVIC	ES			IPLETE		7-77		
							OTA, INC.	***************************************				FOREMAN HH			
W.L.	WC I						NNAPOLIS LANE POLIS, MINN. 55441							<u>J0</u>	
 	UL		٥.		4 days AB	The state of	Alam 1!			9092		SHEET			
-				-		The stratification between soil	ation lines types and	repre the	sent i transiti	me ap ion ma	proxin	nace b gradua	ounga II.	' y	
BBS41576	3											•	 -	: 1	

L_						LOG OF BORI				-				
OWNE				`_		• .	ARCHITE	CT-EN	IGINE	ER N	liller	, Har	son,	
L					ark Housing Auth et West & Louis		Westerbe PROJECT			- Arc	hitec	ts,	nc.	
0112					Park, Minnesota		Oak Pari							
		<u> </u>	Γ	Γ				<u>,</u> -	UNCO	NFINED C	OMPRESS	IVE STRE	NGTH TO	NS/FT.2
7		щ	Ŀ	1				¥Ψ.	-	1	(2	3 3	4 .	5
<u>Õ</u>	ŏ	SAMPLE	Q	₽	DESCRIPT	ION OF MATERIAL		ŽĮ.		ASTIC		TER	LIQ	
DEPTH ELEVATION	PLE	П Sp	12	OVE				UNIT DRY LBS./FJ.		IIT % — — -			6 - LIMI 	r % -∆
13 H	SAMPLE	ΤΥΡΕ	SAM	RECOVER				3	STAN	IDARD "		TRATION	(BLOWS	/FT.)
X		<u> </u>	-		SURFACE ELEVATION	192.8		ļ		10 2			10 5	0
	,	PA	l		Dark brown to b	olack silty sam	nd fill,		0]′		
			l		slightly organi (OL-SM)-fill	ic - damp - fro	ozen -							
	2	SS	\parallel		, ,	correction to				1			ļ	
5.0	,	ss			Brown fine to o gravel - moist				9					
)	33	Hi		-fill					1		-	-	
	1.	ss	П		Brown clayey fi			,	1/4	, ,	}			
	 		Н	1	trace gravel -				Ø,					
10.0					Black organic (OL)	fibrous clayey	silt -		7		3.7	0/0 01	LGAN	ار
10.0	2	33	11		Dark gray silty	clay - stiff			1	1	1 '			
		РА			(CL-CH)	, 5.0,				0	3.5	2/2 2	RGAN	100
ļ	T	<u>55</u> 55	11 1	世	Gray brown fine	e to medium sau	nd trace		10 (\$\frac{1}{2}	J	,,,,		<u></u>
	-			T:	clay, trace fir	ne gravel - we			8 /	4		<u> </u>		
15.0	7	ss		Щ	medium dense - Gray brown fine		nd. trace		<i>,</i> °⊗					
					silt & fine gra			SM)		<u></u>				
·				111					li					
20.0	8	SS			Gray-brown fine silt & gravel -				7					
					medium dense -		.0050 10		1					
						. !			\					
									•					
25.0		ļ	ļ.,				-							
26.5	9	SS			·					⊗12				
					5 h 5 h									
					End of Boring									
30.0					34" ID Hollow s	stem auger casi	ing		ļ					
					used full depth	1]		
					*				•			1		
		L	L	$oxed{oxed}$	O*- Calibrated	l Penetrometer				<u> </u>	<u> </u>	<u></u>	<u> </u>	<u> </u>
W.L.		.51	_		OBSERVATIONS	SOIL TESTIN	C CEBINO			G STAF		1-27- D 1-2		
W.L.	19.				16.81 A.C.R.	OUIL IEOIIN OF MINNES		LO.		B-50			AN HH	
	WC I				A.C.R.	2405 ANNAP MINNEAPOLIS		, .	DRAW	N JO		APPRO	VED J	0
	DCI	16	٠.١	Ŏ,	4 days AB		· · · · · · · · · · · · · · · · · · ·			¥ 909		SHEET		
<u> </u>			•		· · ·	The stratification between soil								ry
DDC 44 F 7	between soil types and the transition may be gradual.													

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					,	LOG OF BOR							,		
OWN							ARCHITE	CT-EN	IGINE	ER N	lille	r, Har	ıson,	-	1
					ark Housing Aut		Westerb	eck,	Bell	- Arc	hite	cts,	lnc.		
SITE					et West & Louis		PROJECT								
	St.	Lo	ou i	5	Park, Minnesot	3 . 	Oak Parl	k Vil		1514150 0		2016 270			1
									UNCON	IFINEU C	.OW5KF2;	O	NGTH TO)NS/FI.4 	
z		쁜	넔					<u>¥</u> ო		1	2	3	4	5	
_F	8	SAMPLE	E DIST.	ا≾	DESCRIP	TION OF MATERIAL		ξĖ		STIC		ATER		UID]
DEPTH ELEVATION	끸	S	삖	킭				3S./	LIM X—	IT %	CON	TENT %	6 UMI 	Т% _Λ	
	SAMPLE	TYPE	SAMPLE	낊				UNIT DRY LBS./FJ.	STAN	DARD "	N" PEN		(BLOWS		
X	S	-	S	<u></u>	SURFACE ELEVATION	N¬, 190.6			-	10 :	(20	⊗ 30 4	10 :	50	
	1	PA			Brown sandy cla		t - (CL)	-		Ø					1
	<u> </u>			Щ	slight creosot				<u> </u>	1	ļ				
	-	├		ш	Brown silty fir very dense - m		and fill	_		l			1		
	2	SS		Ш	very dense	(311)			<u> </u>				<u> </u>]
5.0	1	ss		$\ \ $	Brown fine to		11 -		9.9	*			·		
	-	-	Ш	Ή	loose - moist	- (SP)		Ì		İ	150				
	}	\vdash	$\ \cdot\ $	ᆈ	Brown fine to	medium sand fi	With	7	\otimes	 	 	 	 		1
	4	SS	Ш		a little gray moist - (SP) -	sandy silt - vo	ery loose		14		ly.				
				\pm	Grayish brown	clayey silt fi	ll - ver	ļ <u>-</u>	× 4		3 -		 -		t
10.0		<u>55</u>	$\parallel \parallel$	₩	soft - wet - (ML) - moderate	creosote		P 🔅 🕆		30	-			3
	<i>ار</i>	133	-	Щ	Dark brown to									/	3
]				soft - wet - (I	ot) - moderate	creosote							/	
	1	1		1	Gray clayey si		- wet -					1	1	1	
		<u> </u>			(ML) - slight	creosote odor		ļ	*						
15.0	6	SS	Ш	Ш				(<u> </u>			0			
	6 <i>F</i>	SS	Ш	ᅫ									1		
	1					•				· .		1.	ŀ		
	1				C E:								ľ		1
	‡		,		Gray fine to me of gravel - med	alum sand witi dium dense - ss	n a trace	Ì_							
20.0	7	ss		쒸	(SP)	40,,00			70	1			İ		
	+		ľ'			·	,		7						ł
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	ļ	-	 	\mathbf{H}						1					
25.0	8	ss		"	•				ļ	\ ⊗ ¹³	ļ	1			1
			П		Brown fine to	nadium cand wi	. h. a.					1			
	Brown fine to					f gravel - medi						}	1		
	dense - satur					ted - (SP) - si				\					
	creosote odor									\	120	}			
30.0	9	SS		끡	•	•					20	ł			
	I -	Γ	П	1							T				1
	1			-					1						
	<u> </u>	1	Ц	لي	(continued on r	next page).		L,		<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u></u>	1
				<u>L</u>	OBSERVATIONS	0011	====		_	G STAF		2-1-7			
W.L.						SOIL TESTIN		ES	BORIN RIG		MPLETE	D 2-1	AN HH		1
-	W.L. 7' B.C.R. [14.5' A.C.R.] W.L. WCI 16' AB				··· ··································	OF MINNES 2405 ANNAP	•			N RC			VED R		1
**.L.	frozen to 3.51					MINNEAPOLIS		1				i — —			1
	·····					Mark a stat	-Ai 1'		JOB #		920	SHEET			
•						The stratification	ation lines types and	repre	esent Francit	ine ap	oproxii	mate t	ounda al	ry	•

					·	LOG OF BORI								
OWNE				,			ARCHITE							
					ark Housing Auth		Westerbe			- Arc	hitec	ts, I	nc.	
SITE	-				eet West & Louis s Park, Minnesot		PROJECT Oak Parl	•						
ļ	31	<u></u>	.01	, i i	s Park, milleson	.d	Uak Fair	K VII		CINED C	OSSIGNAC	IVE STRE	NCTU TO	NC /FT)
								٠.		THEO C	()		M3/F1.*
z	Ö	빌	ST.		D.CO.CUID.T	TON OF MATERIAL		≱س		 	2	3 4	. :	5
- F	NO.	SAMPLE	E DIST.	Α		ION OF MATERIAL		¥(STIC		TER TENT %		מוט
DEPTH ELEVATION	PLE	S	급	õ	1	···•	_ \	UNIT DRY WT. LBS./FT. 3			(5	- — —	_^\
22	SAMPLE	TYPE	SAN	RECOVER	(continued from		=)	5	STANI	DARD "I		TRATION	(BLOWS	/ft.)-
30.0	(0				SURFACE ELEVATION	1-#				0 &	20 3	80——— 30 4	0 5	0
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							•							
				Н										
	·				Brown fine to n	nedium sand wi	th a				21			
35.0	10	cc	П		little trace of					. (D 21			
	10	33	Ш	1	dense - saturat creosote odor	ted - (SP) - s	light							
	1	l			CIEOSOLE OUOF			}		/				ľ
				H								'		
						, '				/				
40.0										Ø13				
	111	<u>SS</u> _	Ш	Ш	Brown fine to o	coarse sand win	th		l	Ĭ				
	1				some gravel - n					1				
				Н	saturated - (Si						•	•		
									1					
45.0	12									⊗ ¹³				
	12	33	Ш	11.							}	ļ		
					Grayish brown n		se sand	}	ĺ			}		
					medium dense -	(SP)								
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50.0	13	SS	\prod	П						.178				
		-	Ш	111								 	· · · · ·	
		1			End of Boring		•		·		į	ļ ·		
	ŀ				Hollow stem aug	ner used to fu	ll denth							
]				THOLLOW SEEM BUG	yer useu LOTU.	ii deptii							
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					U - Calibrate	ed Penetromete	r		·					
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W				EL	OBSERVATIONS				BORING	STAR	TED 2	-1-77	! !	
W.L.	UUI						G SERVIC	ES				D2-1-		
W.L.							OTA, INC.			B-50		FOREM.		
W.L.	W.L. WCI 10 AD MINN					2405 ANNAP MINNEAPOLIS,		,	DRAWN			APPRO	VED RC	
<u> </u>	frozen to 3.5'							1	JOB #			SHEET		
				-	· .	The stratifica	ation lines	repre	sent t	he ap	proxin	nate b	ounda	ry
BBS 4157	6					between soil	types and	ı iile i	เลเรเน	on ma	y be	gradua	11.	. 1

LOG OF BORI	NG NO. B	-8 (page	1 of	2)		_	
OWNER	ARCHITECT			• • •		, Han		
	Westerbeck			Arci	ni tec	ts, l	nc.	
Jana Garage Maga a Tanasana Maga	PROJECT N					•		
St. Louis Park, Minnesota	Oak Park \			NED 00	Managa	WE OTO	MOTE =	0.116
			UNCONFI	NED CO	MPRESS:)	NGTH T	ONS/FT.
SAMPLE NO. TYPE SAMPLE NO. 177 PE SAMPLE NO. 177 PE SAMPLE DIST. 100 LEVATION OF MATERIAL NO. 178 PER SAMPLE DIST. 100 LEVATION OF MATERIAL NO. 17		7. WT.	1	2	<u>. </u>	3	4	5
O DESCRIPTION OF MATERIAL	2	ŽĘ.	PLAS			TER		סוט
AMPLE NO. AMPLE NO. AMPLE NO. The Sample DIST. ECOVERY ECOVERY TOTAL SAMPLE TOT		UNIT DRY. LBS./FJ.	LIMIT X— -			ENT % 		
DEPTH ELEVA SAMPLE SAMPLE RECOVE		5			" PENE	TRATION		~
SURFACE ELEVATION 7 190.7			10	20		9 0 4	0	50
Concrete								
		1	1					
Brown medium to coarse sand -	- mearum	ł	1	Ø ¹		·	}	
1 33 11 dense damp (31)				\sim				L
5.0 2 SS			100					
			1	16			i	
3 SS Brown fine to coarse sand wit	h some			\\ \\ \				1
gravel - medium dense - moist				16		٠.		
4 ss	}	l	1	\otimes				
10.0 753 1111	,	- 1		1.				
5 SS				17 Ø				1
				M	.20			
6 SS Brown fine sand - medium dens	ie -	- 1		Я)			
15.0 moist - (SP)			•	-/1				
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		l						
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Brown fine to medium sand - I	oose -		$\overline{}$					
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				§ ¹³		 -	- 	
8 SS Brown fine to medium sand wit	h some	ŀ		7				i
gravel - medium dense - wet -		•		.				
	•		X			·		
		- 1			1			
		[_/_					<u>L</u>
30.0 9 SS Brown fine sand - loose - sat	urated -		8	T				
9 55 (SP)	-		~			·		 -
			. [
(continued on next page)	. 1	1						ŀ
WATER LEVEL OBSERVATIONS			ORING					
N.L. 17.5' WD SOIL TESTING			ORTHG					
V.L. 16.0 B.C.R. A.C.R. OF MINNESC			IG B-			OREMA		
WL DCI 16.5' AB 2405 ANNAPO MINNEAPOLIS, I		_	RAWN	·		APPROV	/EU · R	il.
			OB # 9			SHEET		
The stratifical between soil	tion lines re types and th	epreso	ent the	e app	roxim	ate: bo	ounda I	ry.
	CONTRACTOR OF THE				y	,, uuua		

						LOG OF BORI								
OWNE	R						ARCHITE							
L					ark Housing Autl		Westerb	-		- Arc	hited	ts, I	nc.	
SITE					et West & Louis		PROJECT			•				
	St.	Lo	u	is	Park, Minnesota	a .	Oak Parl	k Vil						
								١.	UNCON	FINED C		IVE STRE	NGIH IU	NS/F1.4
7		Щ	ř.		,			Şε	1	1	2	3 4	4 .	5
<u> </u>	Ö	SAMPLE	旨	숥	DESCRIPT	ION OF MATERIAL		7₹		STIC		TER	LIQ	
YTH	4	S,	H	KE		_		UNIT DRY WT. LBS./FT. 3	X—	IT % — — -	CON	TENT %	LIMI	「% ∕\
DEPTH ELEVATION	SAMPLE	TYPE	AM	RECOVERY	(continued from	n previous page	e)	S	1	DARD "I		TRATION	(BLOWS	/EL)
30.0	Ś	-	က	۳	SURFACE ELEVATION	√ -‡			501	0 2	0	8)—— 30 4	0 5	<u> </u>
3-1				H					20	<u> </u>				
								•			•	·		
					Brown fine sand	d = loose = sa	turated :							
					(SP)	10036 38	Lurateu		6					
35.0					,				⊗ຶ		l ·			
11.0	10	SS	Щ.		-			<u> </u>	\	1			·	
										\setminus		1		
							:	<u>. </u>				<u></u>		
		•												
40.0	77			Π				1		}	≥ ²¹			
		33	11				;		į	/				
					Brown medium to	o coarse sand v	with	٠ .	i			, ·	i.	
					some gravel -	loose – satura	ted -							
			,,		(SP)	,			8 ~	1				
45.0	12	55						i				ĺ		
		33					,		1	\				`
			-	\vdash					ļ	\ -	 	 		·
					Brown fine sand	d - medium den	se -		l			1		
			-	1	saturated - (SI				ł		21			
50.0	13	SS				·				(<u>ک</u> در	<u> </u>		
					End of Boring									
					2.1.4 07 0079] .					
					Hollow stem aug		28 feet			}			•	
					to termination	depth		ļ.						
					· ·				1					
	·						_			l ·				
	\ .									}				
F						•	·		1	1				
			H											
. W	ATEF	L	V	EL	OBSERVATIONS				BORIN	G STAR	TED 2	2-1-77	,	
W.L.		.5'				SOIL TESTIN	G SERVIC	ES	BORIN	G CON	IPLETE	D 2-1		
W.L.		.0'				OF MINNES	OTA, INC.			B-40		FOREM		
W.L.					AB	2405 ANNAP MINNEAPOLIS,		1.	DRAW			APPRO	VED R	C
	DCI 15' 3 hrs. AB									9092	لــــــــــــــــــــــــــــــــــــــ	SHEET		
	·			·		The stratification between soil	types and	repro	esent i	the ap	proxir	nate b	ounda	ry
88S41576	<u> </u>					Detween SOII	types all		u ansil	OIL III	y ne	grauut	at.	

LOG OF BOR		_		·
OWNER	ARCHITEC	CT-EN	NGINEER Miller	, Hanson,
St. Louis Park Housing Authority	Westerbe	ck,	Bell - Archite	cts, Inc.
SITE 32nd Avenue West & Louisiana Avenue	PROJECT Oak Park			
St. Louis Park, Minnesota	Vak raik	. VII		SIVE STRENGTH TONS/FT.
			ONCONFINED COMPRES	O
Z G H L		¥̃ε	1 2	3 4 5
DESCRIPTION OF MATERIAL MO DESCRIPTION OF MATERI	-	₽F.		ATER LIQUID
AMPLE NO. THE SAMPLE NO. THE SAMPLE DIST THE SAMPLE DI		UNIT DRY WI LBS./FJ. 3	1	TENT % LIMIT %
SAMPLE SA				ETRATION (BLOWS/FT.)
SURFACE ELEVATION 7 188.8				⊗
Medium dark brown fine to co	arse			
1 PA sand fill - some silt - trac		દ	1 8	
clay lumps - moist - frozen				
1ASS foot depth - medium dense -	(SM-SC)	•		
5.0 2 SS fill			3	
Black organic silty sand top				
wet - medium dense - (OL-SM) slight creosote odor to 8 fo			(A) (D)	
1	101			
10.0 4ASS Gray & slightly brown silty	& clavey			
sand - wet - medium dense -			19/32	
	/			
	-		/	
			\$10	
15.0 5 SS Gray brown fine to medium sa	nd -		(a).	
trace silt & gravel - satura	ted -			
medium dense - (SP-SM)	enous			
			12	
20.0 6 SS	Ì	1	\&\dagge^{-2}	
	·		 \	
Brown fine to coarse sand -	trace		1 \	
silt & gravel - saturated -	medium			
dense - (SW)	İ		188	
25.0 7 SS				
End of Boring				
Solid stem auger used full d	epth			
	į			
WATER ABUSING TONICS	<u> </u>	· · · · ·	20000 220	1 26 72
WATER LEVEL OBSERVATIONS W.L. 17.0' WD SOIL TESTIN	o ormuner	-	BORING STARTED BORING COMPLETE	
W.L. B.C.R. A.C.R. OF MINNES	-	:9	RIG B-40	FOREMAN CSB
W.L. 17.0' A.B. 0 hr. 2405 ANNAF	POLIS LANE		DRAWN JO	APPROVED JO
WC1 22.0' A.B. MINNEAPOLIS	, MINN. 55441		JOB # 90920	SHEET
	ation lines	renre	esent the approxi	
	types and	the	transition may be	gradual.
BBS41576				 -

	LOG OF BOR	ING NO.	B-10	(pag	e 1 o	f 2)			
OWNER		ARCHITE	_				Hans	on,	
St. Louis Park Housing Aut	hority	Westerb							
SITE 32nd Street West & Louis		PROJECT							
St. Louis Park, Minnesot	a	0ak Par	k Vi						·
1_F 4 3 4 6	TION OF MATERIAL)RY WT. /FJ. 3	PLA	FINED CO	2 W/	IVE STRE 3 ATER TENT %		5 1 UID
DEP BAMPI			UNIT DRY LBS./FJ.	X-		(N" PENI	TRATION	(BLOWS	$-\Delta$
SURFACE ELEVATIO	N→ 188.3	```			0 2	0	30 4	0 5	0
	medium sand w fill - moist sote odor								
trace of grav	medium sand wi el fill - loos moderate creos	e -		7⊗ ⊗2	·				
					.a				
Black fibrous moist - soft	and decompose - (Pt)	d peat -)) (,	
15.0 5 SS Gray silt wit very soft - w	h a little san et - (ML)	d -	*(<u>/</u> 2_			0		
	coarse sand wi - loose - wet								
25-0 7 ss	· .			(8				
	medium sand w - medium dense				\ ⊗"4				
(continued on	next page)		ı	BORING	CTAD	TEO	2-1-7	7	
W.L. 5.5' WD	SOIL TESTIN	וני פבטאוניו	-				D 2-1	<u> </u>	
W.L. 7.0' B.C.R. 7.0' A.C.R.	OUIL TEOTIN			RIG B	-50			AN HH	
W.L. WC1 7.5' AB	2405 ANNAP	POLIS LANE		DRAWN	ŖĊ		APPRO	VED R	C
	MINNEAPOLIS	, MINN. 55441	1	JOB #		20	SHEET		
	The stratification	ation lines							ry
	between soil								1

						LOG OF BORI								
OWNE				`_		•	ARCHITE	CT-EN	IGINE	ER Mi	ller,	Hans	on,	
					ark Housing Autl		Westerl PROJECT			- Ar	chite	cts,	inc.	
SITE					et West & Louis Park, Minnesota		0ak Pai							
	31.	I		, 3 	Tark, Tillinesoca		OUK TAI				OMPRESS	IVE STRE	NGTH TO	NS/FT.
		l					٠.	Į.			(<u>) </u>		
N O	Š.	PLE	TSIC		DESCRIPT	ION OF MATERIAL		× Λ γ		1	2 	3 4 		5
£ ξ	Щ	SAM	m C	ER				RO.Y	LIM	STIC IT %	CONT	TER ENT %		UID T %
DEPTH	SAMPLE	TYPE SAMPLE	MPL	် ၁				UNIT DRY LBS./FJ.				TRATION		$-\Delta$
I	SA	ĭ	SA	쮼	SURFACE ELEVATION		· · · · · · · · · · · · · · · · · · ·)	l		0	<u> </u>		
30.0	 		-	Н	CONTROL ELEVATION		· · · · · · · · · · · · · · · · · · ·		1		20 3 	0 4	0 5	0
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75 0	 		П	Ш			-		6	010				
35.0	9	SS	Ш				. •			\setminus				1
					Brown fine to					\ \		}		<u>.</u>
					little gravel	- Toose - Wet	- (5P)	· ·	l	\ \	}			
		ŀ						ļ	1	\ \\	İ]
40.0	10	9					,			18 🛇				}
	-	33	Ш]	<u> </u>	1		
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	ŀ													
<u> </u>									 			ļ		
45.0	11	ss		Щ										
			1		D É: +			Į]	\			
					Brown fine to a 4!! layer of sai				•					
					at 49.0' - med						\			
F0 0		-	П	Ш							27			
50:5	12	SS	Ш	Щ					ļ		30			
				1	End of Boring						}			
							11 1		ļ ·					
					Hollow stem au	ger used to ru	ii aeptn	,	İ		İ			
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14/	ATER				OBSERVATIONS	<u></u>	·		BOBIN'	S STAR	TED 2	 -1-77	L	L
W.L.		5'				SOIL TESTIN	G SFRVIC					D 2-1		
W.L.	7.	01	B.C).R.	7.01 A.C.R.	OF MINNES	OTA, INC.	~~	RIG			FOREM.	AN HH	
1W.L. 1 WG1 / 50 MD						2405 ANNAP MINNEAPOLIS		,	DRAW	N RC		APPRO	VED R	C
									JOB #			SHEET		
						The stratifica	ation lines	repre	sent i	he ap	proxin	nate b	ounda	ry
between soil types and the transition may be gradual.										 	AY DE	yı auda	474	

		LOG OF BOR						•		
OWNER	-		ARCHITE	CT-EN	IGINEE	R Mi	ller,	Hans	son.	
St. Louis	Park Housing Aut	hority	Westerb	eck,	Bell -	- Arc	hitec	ts,	Inc.	
SITE 32nd Str	eet West & Louis	iana Avenue	PROJECT							-
St. Loui	s Park, Minnesot	a	Oak Par	k Vil						
1					UNCONF	INED CO	MPRESS	IVE STRE	NGTH TO	NS/FT.2
				≷ω T			·(3 -	4 4	 5
NO. NO. JUN	DESCRIP'	TION OF MATERIAL		≥H	PLAS	STIC	W	TER	110	UID
SAN E				E	LIMIT			TENT %		
BLEVATION SAMPLE NO. TYPE SAMPLE SAMPLE DIST		•		UNIT DRY V	X					~
SAMPLE NO. TYPE SAMPLE SAMPLE DIST.		400 -		3	SIAND	ARD "N	_	RATION	(BLOWS	/FT.)
\times	SURFACE ELEVATIO	N +188./			10) 2			0 5	0
	Greenish gray	clavev fine to	o medium					·		
	sand fill with				1 1	14				
1 55				i		$\otimes_{\mathbf{a}}$				
1 33 1				<u> </u>						·
5.0 _{2 SS}	Gray fine to m					168				
	some gravel -	medium dense :	- moist -	·] [
	(SP)	aile, fir- +-		ļ - -	1				ļ	ļ
3 SS	Gray slightly sand fill with				\otimes^4					
	saturated - (S							1		
10.0 4 55	odor of fuel o				⊗"			ŀ		\ \ <u>\</u>
							· - * · · · · · · · · · · · · · · · · ·	 	 	
	Dark brown to	black fibrous	peat -		1 11			·	1	
4A PA	wet - (Pt)						•			
						<u>.</u>				
15.0 5 SS					88					
15.0 5 55	Black decompos				/					1
	shells - soft	- moist - (Pt))		ĺ			· ·	. ,	/
									/	
			٠		$\int d^{2}$,	ł	
	Black sandy cl	av to silty cl	lav -		\$20°			Ø		
20_0 6 SS	soft - wet - (ay		Į į			Ĭ.]	
		02 30,							} i	
				ļ				 		
				Ì	* 7⊗			1.1	1	
	Ц ,			. (P'\			4		
25.0 7 SS	Greenish gray	silt with some	e clav					Ø		
	and a little s							li .		.
	saturated - (M		_			·]		li	'	
		•	-					1.		
	<u> </u>				/			1:		
30.0 8 ss	Ц			. ,	<u> </u>			0		
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					ا * آفد	-				
	(continued on	next page)						1	• 1	
WATER LEVE	OBSERVATIONS	T	<u> </u>	1	BORING	STAP	TED	1-31-	77	
w.L. 7' WD		SOIL TESTII	אני פבסאורי		BORING					
W.L. B.C.	R. A.C.R.	1	TU DENYIU SOTA, INC.	LO	RIG B					, PS
W.L. 6.1' AB		2405 ANNA	POLIS LANE	· 1	DRAWN				VED R	
		MINNEAPOLI	S, MINN. 5544	1	JOB #			SHEET		
<u> </u>		The stratific	nation lines	<u></u>			——			rv
		The stratific between soi	il types and	the 1	transitio	on ma	y be	gradu	ounua al.	' y
		I DELMEEN SON	n types and	a ure i	uaisiii	JII 1110	,, ,,,	grauu	41.	

					LOG O	F BORI	NG NO.							
OWN			-				ARCHITE	CT-E	NGINEE	R Mi	ller	, Hans	son,	
SITE			_		ark Housing Authority		Westerbo PROJECT			- Arc	hited	cts,	Inc.	
311					eet West & Louisiana A s Park, Minnesota	venue	Oak Parl							
	T]	Γ						UNCONF	INED C	OMPRESS	SIVE STRI	ENGTH TO	NS/FT.2
'z		Щ	ST.		•			≱α	1		2	3	4	5
H QTP	NO.	AMP	ā	ΡĄ	DESCRIPTION OF M	IATERIAL		FE.	PLAS LIMI			TER TENT 9		י טום ד %
DEPTH ELEVATION	SAMPLE	TYPE SAMPLE	MPL	SOV	(continued from previ	ous page	.)	UNIT DRY LBS./FJ.	X	. – -		9		$-\Delta$
L	_ ~	Σ	SA	RE	SURFACE ELEVATION	ous pugs		5			(8	(BLOWS	<u>.</u>
30.0	<u>'</u>		-	H	Greenish gray silt wi	th some	clay		† 'i'	D· 2	20 :	30 4	10 5	0
					and a little sand - v			:						
	3			i	saturated - (ML)									
		SS	П	Ш	Greenish gray silty f					17 _Ø		3		
35.0	7-	33			sand with a little gr dense - saturated - (nedium						 	
	1				1									
	3		1		End of Boring	•	·							
					Boring augered to ful-	l depth					:			
	=				Boring relocated 2' e	ast belo	w 21.5'				İ			
	1				depth									
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	1													·
W.L.	VATEF			<u>EL</u>		TEOTIM	OFMUS	-	BORING			1-31-		
W.L.				 C.R.		I ESTIN SF MINNES	SERVICE	F2	BORING RIG B-					PS
W.L.	6.	11			24	05 ANNAPO			DRAWN				VED R	С
	<u> </u>			·		· · · · · · · · · · · · · · · · · · ·	···		JOB #			SHEET		
					The	stratifica	tion lines types and	repre	esent th	ne ap	proxin	nate b gradu:	ounda al.	ry
bbc 44 =					Deta		-, p-00 and			,,,,,	.,	J		•

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			-,			LOG OF BORI	NG NO.	B-12						
OWN						•	ARCHITE	CT-EN	IGINE	ER Mi	ller,	Hans	on,	
					ark Housing Autl		Westerbe			- Arc	hitec	ts, I	nc.	
SHE	-				et West & Louis Park, Minnesota		PROJECT Oak Parl						•	
·	7	1	<u> </u>	1 3	raik, millesoco	<u> </u>	Oak Tail			FINED C	OMPRESS	IVE STRE	NGTH TO	NS /FT 2
1			١.					j			()———		
Z	NO.	급	IST	ERY	DESCRIPT	ION OF MATERIAL		/ WT		 	2 	3 4	‡ 5 	
F.E.		SAMPLE	m O	Ē	DEGOM!	10,1 01 11,1112111112		PAO.		STIC		NTER FENT %	LIQI LIMI	
DEPTH ELEVATION	SAMPLE	Щ	MP.	RECOVER				UNIT DRY LBS./FJ.	X		- (9		$-\Delta$
	- IAS	TYPE	SA	H.	SURFACE ELEVATION	N¬ 196.7	··	ס	I —			3	(8LOWS) 0 5	
	-	-	m	П					 			1		·
	7				Dark brown & s organic sand,				i					
	7				frozen to 3 fo			1					,	
	1	PA	Ш	Ш		· ·	·							
5.7			$\ \ $		Brown fine san	d, little silt	-							
	 2	PA	$\parallel \mid$	\parallel	moist - (SM)	· 			ļ	<u> </u>	-	<u> </u>		-
	,	DA			Brown fine to		race			}				
8.0	3	РА	Ш	Ш	silt - damp -	(38)			<u>:</u>	-	 -	ļ	/	
]				End of Boring	·								
10.0	닠.				 Solid stem aug	are used full	donth					ļ		
	_				30110 Stelli aug	ers useu rurr	deptii.		l					
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	3													
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	1									,				
-	VATE	l	EV.	L EL	OBSERVATIONS	<u> </u>	<u></u>		BORING	G STAR	I TED 1	 -26-7	 '7	
W.L.		ry I				SOIL TESTIN	G SERVICI		BORIN	G COM	IPLETE	D 1-26	-77	·
W.L.				C.R	. A.C.R.	. OF MINNES	OTA, INC.	1	RIG B			FOREM		
W.L.		<u>ry</u> /			1 F 1 2-	2405 ANNAP MINNEAPOLIS		,	DRAW		-	APPRO'	VED JO	· ·
		C I	4.	. 5	¹ 5 days AB				JOB #		1	SHEET	· ·	
<u> </u>	·		_			The stratification between soil	ation lines	repre	sent i	the ap	proxin	nate b gradus	ounda: al.	ry
RASATS	76 '			<u> </u>		Detacel 2011	יזף כי מווני	.		1110	., De			1

						LOG OF BORI	NG NO.	B-1	3					
OWNE					6		ARCHITE			•		, Har		
				_	ark Housing Auth		Westerbe PROJECT			- Arc	hited	ts, l	nc.	·
SITE					eet West & Louis s Park, Minnesot		Oak Parl							
	ٽ	· · ·	<u>-</u>	Ι.	3 Tark, minicipal		Val.			FINED C	OMPRESS	IVE STRE	ENGTH TO	ONS/FT.
		<u></u>	Ŀ		,		ļ	۳ <u>۲</u>		1 .	(,	Q	4	
O.	Š.	MPL	DIS	≿	DESCRIPT	TION OF MATERIAL	•	> > :	PLA	i STIC	T W/	TER	LIC	iuo Juo
DEPTH ELEVATION	Щ	SA	빌	Ž			!	UNIT DRY WT LBS./FJ. 3	LIM	IT %	CON	TENT %	6 LIM	T %
DEF	SAMPLE	TYPE SAMPLE	AMF	ECC	L <u></u>	· · · · · · · · · · · · · · · · · · ·		N N			N" PEN	ETRATION	BŁOWS	
	S	-	တ	T.	SURFACE ELEVATION	198.3		<u> </u>	1	0 2	20 :	⊗ 30 4	10 5	50
	1	AS	III	\prod	Brown sand fill			211						
		AS AS		Щ	silty topsoil - Brown silty cla			-SM)		17	<u> </u>			
		ss			(CL-ML) fill					⊗		<u> </u>	1	
	ł	55			Brown fine sand)	⊗ ² ?			
5.0	Z	SS	Ш	Ш	lumps - moist - (SP-SM)	- Medium uense		· 			1	ļ. <u>.</u>		<u>. </u>
	-	_					_			!	24			
	3	SS		1	Brown fine to m medium dense -		damp -			·	18			
		-	 	Н	illeurum ucirse	(31)		}			1 77			
10.0	4	SS	Ш	Ш							²⁷ &	ļ		ļ
11.5		ςς			Light gray brow sand, trace gra			(SP)				1	140 0	
11.2		35	٣	11		110130	401130	->=:						<u> </u>
	<u> </u>				End of Boring									
					Solid stem auge	er used full de	epth							
					·				.					
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W/	WATER LEVEL OBSERVATIONS								BORING	STAR	TED	1-25-	77	L
W.L.	W.L. Dry WD					SOIL TESTIN	G SERVICI	ES (BORING	G COM	APLETE	D 1-2	5-77	
W.L. B.C.R. A.C.R.				C.R.	A.C.R.	OF MINNES 2405 ANNAP	OTA, INC.	1		B-40		FOREM		
W.L. Dry AB						MINNEAPOLIS,		1	DRAWN		$\overline{}$	APPRO	VED J	0
						The stratifies	ties lines		JOB #	 		SHEET	da	~
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					ark Housing Auth		Westerbe	eck,	Bell	- Arc	hitec	ts, I	nc.	
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ļ	St.	LC	ou i	S	Park, Minnesota		Oak Parl	k Vil		EINED C	MPDESS	IVE STOE	NGTH TO	NC /ET ?
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1 1	ž	AM.			DESCRIPTI	ON OF MATERIAL		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	- PLA	STIC		TER TENT %	LIQI	-
DEPTH ELEVATION	SAMPLE	S S	JP.	Š				UNIT DRY LBS./FJ.	X-		`)		$-\Delta$
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	1	PA	Ш		LIACE TOOLS - 0	amp - 1102en	- (UL-3M		<u> </u>		ļ			
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	2	SS		Ī	gravel & silt -	damp - dense	to medi	μm			27			
5.0	<u> 2</u> £	35	Ш	1	dense - (SM-SP)						Ø			
		<u> </u>		\prod	Brown fine to m	edium sand, t	race	ŀ					·	
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W.L.		ry	WD)		SOIL TESTIN	G SERVIC	es l	BORIN	G CON		D 1-2	5-77	
W.L.			B.C		A.C.R.	OF MINNES	OTA, INC.		RIG B				AN CS	
W.L.		ry				2405 ANNAP MINNEAPOLIS,		1	DRAW			APPRO	VED J	0
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ō N	è	AP.L.E	TSIO	>	DESCRIPTION OF MA	TERIAL		≶°' ≿ -	PI A	STIC	1 w	TER	LIO	110
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	ĹĒ	VER				UNIT DRY LBS./FT.		IT % .	CON	TENT %	LIMI	
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x	- °	[-	S	۳	SURFACE ELEVATION 7 200.	6		. –	<u> </u>	0 2	20	8) 30 4	0 5	 i0
				П	Dark brown silty fine t			·····						
	1	PA			fill, trace asphalt & moist - (SW) fill - str					İ				
	1				odor to 3 foot depth -								'	
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5.0	- 7	DA			depth - frozen to 2.5 f	TOOT G	eptn					1		
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8.0	4	РА			coarse sand & gravel -									
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W.L.	D	ry A			<i>1</i> 240:	5 ANNAP	OLIS LANE	.	DRAWN				VED JO	
					MINN	:APOLIS,	, MINN. 5544	1	JOB #		20	SHEET		
					The s	tratifica	ation lines	repre	esent t	he ar	proxir	nate t	ounda	ry
200115					betwe	en soil	types and	i the t	transiti	on ma	ay be	gradu	al.	. 1

OWNER St. Louis Park Housing Authority STE 32nd Street West & Louisiana Avenue St. Louis Park, Minnesota DESCRIPTION OF MATERIAL DESCRIPTION O			LOG	OF BORI			-					
SITE 32nd Street West & Louisiana Avenue St. Louis Park, Minnesota Column Content	1				ARCHITE	CT-EN	IGINÉE	R Mi	ller,	Hans	on,	
St. Louis Park, Minnesota Oak Park Village UNCONFINED COMPRESSIVE STRENGTH TONS/FT/ 1 2 3 4 5 PLASTIC WATER LIQUID LIMIT % CONTENT % LIMIT % LIMIT	L				Westerbe	eck, i	Bell -	- Arc	hitec	ts, l	nc.	
DESCRIPTION OF MATERIAL DESCRIPTION OF MATERI				Avenue						•		
DESCRIPTION OF MATERIAL A	31.	Louis	rark, minesota		Uak Fair	VII		INED CO	OMPRESS	IVE STRE	NGTH TO	NS/FT.
SURFACE ELEVATION 196.4 1 AS Dark brown silty fine sand topsoil fill, trace roots & brown clay moist - frozen - (0L-SM) fill 1 SS Brown fine to medium sand, trace coarse sand, trace gravel & silt - moist - medium dense to dense - frozen to 1.5 foot depth - (SP) 4 SS Dark brown fine to medium sand, trace coarse sand, trace gravel & silt - moist - medium dense to dense - frozen to 1.5 foot depth - (SP) Light brown fine to medium sand - * Brown fine to medium sand, trace coarse sand & gravel, trace silt - moist to wet - dense - (SP-SM) End of Boring Solid stem auger used full depth					٠.	Ŀ		``	() 		
SURFACE ELEVATION 196.4 1 AS Dark brown silty fine sand topsoil fill, trace roots & brown clay moist - frozen - (0L-SM) fill 1 SS Brown fine to medium sand, trace coarse sand, trace gravel & silt - moist - medium dense to dense - frozen to 1.5 foot depth - (SP) 4 SS D Dark brown fine to medium sand, trace coarse sand, trace gravel & silt - moist - medium dense to dense - frozen to 1.5 foot depth - (SP) Light brown fine to medium sand - * Brown fine to medium sand, trace coarse sand & gravel, trace silt - moist to wet - dense - (SP-SM) End of Boring Solid stem auger used full depth	o o	PLE SIST	DESCRIPTION C	OF MATERIAL		≱π ⊁∺		2710	2 	3 4	-	
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Dark brown silty fine sand topsoil 1 AS	DEP	F F S			-	F.B.	• .					~~~
1 AS Dark brown silty fine sand topsoil fill, trace roots & brown clay - moist - frozen - (OL-SM) fill 1 SS Brown fine to medium sand, trace coarse sand, trace gravel & silt - moist - medium dense to dense - frozen to 1.5 foot depth - (SP) 4 SS Light brown fine to medium sand - * Brown fine to medium sand, trace coarse sand & gravel, trace silt - moist to wet - dense - (SP-SM) End of Boring Solid stem auger used full depth			SURFACE ELEVATION 7	196.4	·	٠ ١	· —			8)		
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coarse sand, trace gravel & silt - moist - medium dense to dense - frozen to 1.5 foot depth - (SP) Light brown fine to medium sand - * Brown fine to medium sand, trace coarse sand & gravel, trace silt - moist to wet - dense - (SP-SM) End of Boring Solid stem auger used full depth			•							ا ا		٠
moist - medium dense to dense - frozen to 1.5 foot depth - (SP) 4 SS III 10.0 44SS Light brown fine to medium sand - * Brown fine to medium sand, trace coarse sand & gravel, trace silt - moist to wet - dense - (SP-SM) End of Boring Solid stem auger used full depth	5.0 2	SS III							ŀ	\\ x	·	
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10.0 44 SS Light brown fine to medium sand - * Brown fine to medium sand, trace Coarse sand & gravel, trace silt -	3	ss '							26			
10.0 44 SS Light brown fine to medium sand - * Brown fine to medium sand, trace Coarse sand & gravel, trace silt -								.,				
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WATER LEVEL OBSERVATIONS W.L. Dry WD SOII TESTING SERVICES BORING STARTED 1-25-77 BORING COMPLETED 1-25-77				All TEATING	ף פרטווייי							
W.L. Dry WD SOIL TESTING SERVICES BORING COMPLETED 1-25-// W.L. B.C.R. A.C.R. OF MINNESOTA, INC. RIG B-40 FOREMAN HH						<u>r9</u>	RIG B-	-40				
W.L. Dry AB 2405 ANNAPOLIS LANE DRAWN JO APPROVED JO	W.L. Dry			2405 ANNAP	OLIS LANE							
MINNEAPOLIS, MINN. 55441 JOB # 90920 SHEET				MINNEAPOLIS,	MINN. 5544	<u> </u>	JOB #	909	20	SHEET		
The stratification lines represent the approximate boundary												ry
between soil types and the transition may be gradual.	BBS41576	·		petween soil	types and	tne t	ransitio	on ma	y be	gradua	17.	

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/.L.	Dr	y A		: 1	,,,,,,,,,	2405 ANNAF	•		DRAW			APPRO		J0	1
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OWNER	•	ARCHITE			• •		; Han		
St. Louis Park Housing Aut		Westerbe			- Arc	hited	ts, I	nc.	
SITE 32nd Street West & Louis	iana Avenue	PROJECT							
St. Louis Park, Minnesot	a	Oak Parl	k Vil		rivido o	1100500			
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SAMPI SAMPI RECO			N N	STAN	DARD "I	v" PENI	TRATION	(BLOW)	
SURFACE ELEVATIO	N¬ 193.1					(8)		50
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to 1 fo			-	7					þ
1ASS	ong creosote o	lor		7	 	ļ			
2 SS Brown clayey f	ine to coarse	sand &		7	Q			<u> </u>	<u> </u>
5.0 ZASS gravel fill -			fil		3	3			1
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3 SS Black organic wet - loose -		clay -				t g r i !			
	(UL)			*		ř			1
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10.0 4ASS Brown & slight				"O	* (X)	被			1
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trace gravel -	wet - medium o	lense -/							
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WATER LEVEL OBSERVATIONS	<u> </u>		f	BORING	STAR	TED	1-25-	1—— 77	٠
W.L. Dry WD	SOIL TESTIN	SERVICE		BORING			D 1-2		
W.L. B.C.R. A.C.R.	OF MINNES		Lu F		3-40		FOREM.		SB
W.L. Dry A.B.	2405 ANNAP	DLIS LANE	. li	DRAWN	ı J0		APPRO	VED	10
	MINNEAPOLIS,	MINN. 55441		JOB #	909	920	SHEET		
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					ark Housing Auth		Westerbe PROJECT			- Arc	hitec	ts, l	nc.	
SHE	32r	id :	St	re	et West & Louis	iana Avenue	1							
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Z O	o Q	필	Sist	\ -	DESCRIPT	ION OF MATERIAL		≯ [™]		STIC	2 1	TER	110	s UID
HAY	щ	SAN	Щ	VER.				S./F	LIMI	T %	CON	FENT %	LIMI	
DEPTH	SAMPLE	TYPE SAMPLE	MP	8				UNIT DRY LBS./FJ.	X— STANI	 DARD "1		B— — - Tration	 (BLOWS	- <u>\</u>
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	3,	\$ <u>\$</u> \$ \$		\parallel	/ Dark gray brow		trace \	·	10	§	O.k	 	ļ	<u> </u>
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					ys AB.	MINNEAPOLIS	, MINN. 5544	1	JOB #	- 		SHEET		
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						between soil	types and	the	ransiti	on ma	y be	gradua	al.	-
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					ark Housing Aut		Westerbe PROJECT	eck,	Bell_	- Arc	hited	t, In	c.	
SITE					eet West & Loui: s Park, Minneso		Oak Parl			•		•	:	·
		Ī		Γ.			Joak Tall			FINED CO	OMPRESS	IVE STRE	NGTH TO	NS/FT. ²
		ш	L				·	3₹	<u> </u>	- 	(2	3 ·	4 (5
DEPTH ELEVATION	o N	TYPE SAMPLE	DIS	≿	DESCRIPT	ION OF MATERIAL		UNIT DRY WT. LBS./FJ. 3		STIC		TER	LIO	
PTH EVA	끨	SA	PLE	OVE				T DI		IT % 		ENT %	. LIMI' 	T % — ∕\
	SAMPLE	ΥPE	SAM	ZEC(; 		· · · · · ·	N N N N			N" PENE	TRATION	(BLOWS	/fT.)
X	<u>"</u>	_			SURFACE ELEVATION	190.3				0 2	20 3	8) 30 4	0 5	0
					Brown silty f				1					
	1	AS		Н	fill, trace g \ fill	ravel - moist	- (SW)		 	ļ	ļ			
]				\ <u>.1111</u>		/		1					
5.0	2	PA			D						· ·			
13.4	 		Ħ		Brown fine to silt & gravel	- moist - (SW)					(
						·								
8.0	3	РА								<u></u>	ļ			
10.0					End of Boring		·		ŀ					
	1				Solid stem aug	ger used full o	depth							
ļ	1													
	1											1		
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-		1 LI		EL.	OBSERVATIONS	· · · · · · · · · · · · · · · · · · ·			BORIN			1-26-		
W.L.	Dr	y W				SOIL TESTIN		ES	BORIN	G COM		D 1-2		
W.L.	D =	y A).R	. A.C.R.	OF MINNES 2405 ANNAP			RIG DRAW			FOREM.	AN HH VED J()
				51	5 days AB	MINNEAPOLIS		1		9092		SHEET	- 2.5 0(-
						The stratifica	ation lines	repre	esent	he ap	proxin	nate b	ounda	ry
						between soil	types and	the	transiti	ion ma	ay be	gradua	al.	. !

:				LOG OF BOR								
OWNER		-			ARCHITE	CT-EN	GINE	ER Mi	ller,	Hans	on,	
			Park Housing Au		Westerbe PROJECT	eck, I	Bell	- Arc	hitec	ts, 1	nc.	
			et West & Loui Park, Minneso		Oak Park							
	1	П						FINED CO	MPRESSI	VE STREE	NGTH TO	NS/FT. ²
	Щ		•			₩T.		1 2	(2 ;)3 4		5
DEPTH ELEVATION	MP		DESCRI	PTION OF MATERIAL		ÄŸ.	PLA	STIC		TER	LIQ	
DEPTH	S	PE				UNIT DRY LBS./FJ.	LIMI X	T % — — —		ENT %	LIMI	-Δ
	ΤΥΡ	SAMPLE DIST.		·		. S.	STANI	OARD "N	I" PENE 	TRATION	(BLOWS	/ft)
		1 1 7	SURFACE ELEVATI	ON _}		-	1	0 2		0 40	5	0
			Brown silty f	ine to medium s	and fill							
	AS			- moist - (SW)								
	2 PA				. '	Ĭ						
5.0	\top			sand - moist -	(sc)					· ·		
			fill					@				
 	3 PA	Ш	/Black to dark	gray silty cla	у, \			,				<u>.</u>
8.0	PA	₩.	·					O)				
			End of Boring									
10.0		Ш.	Solid stem au	ger used full d	epth							
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WAT		EVEL	OBSERVATIONS	-		ľ		STAR		1-26-		
W.L. [ry V	/D B.C.F	R. A.C.R.	SOIL TESTIN		LV r		<u>з сом</u> 3-40		D 1-20		
· 	ry A			2405 ANNAI	POLIS LANE		DRAWN			APPRO\		
				MINNEAPOLIS	, MINN. 5544 	1 .	JOB #	90920)	SHEET		
· · · ·				The stratific	ation lines	repre	sent t	he ap	proxin	nate b	ounda	ry
BBS41576	· 		· · · · · · · · · · · · · · · · · · ·	between soi	types and	ine t	าสทรุเน	on ma	y be	gradua		

			_	_	· 1	LOG OF BORI	NG NO.	22						
OWN	ER		,				ARCHITE	CT-EN	GINE	R				
					Park Housing A	•	Miller,			leste	rbeck	, Bel	1	
SITE					et West and Lou		•							
	St	. L	Oι	115	Park, Minnesot	a 	0ak Par	k Vil						
							·		UNCON	INED CO	OMPRESS	IVE STRE	NGTH TO	NS/FT.
z		LE	37					¥. β	1	. :	2	3 4	4 5	5
DEPTH ELEVATION	Š	TYPE SAMPLE	ă	۲	DESCRIPTI	ON OF MATERIAL		UNIT DRY LBS./FT		STIC	W/	ATER	LIQ	
FYH	٦	တ်	PLE	S				T D	LIMI X—	T % 	CON	TENT %	- LIMI	T % — ∕\
임교	SAMPLE	YPE	AM	JEC.				N N	STANE	DARD "			(BLOWS	/हा.)
X	S	-	ľ		SURFÁCE ELEVATION	+194.7			1	0 2		& 30 4	0 5	0
	1	SS			Dark brown and	light brown fi	ne to		&5					
	┦		Щ	\vdash	medium sand, tra gravel - loose	ace of silt ar - moist - (SP-	id fine SM) Fill			/		<u> </u>		
	2	SS	$\ $	$\ $,	Ø			
	}	<u> </u>	₩	H	Light brown fin with small lens			•	a		24			
5.0	3	SS		Щ	very fine sand	– (SM-ML) – me	edium	Ì	98					
	4	ss	\prod		dense - damp -	(SP)		}		18,8				
	+	-	₩	Ħ						Ø12				
	5	SS	\parallel	Щ						8/2				
	6	SS	II	Ш						\ \ \				
10.0		33	Щ		D 6: 4		e			18	}			
	-		_		Brown fine to co silt - medium do					{				
	7	ss			Jire modram d	onse damp	(3.17)			ė	20			
	╁┈┈		٣											
	8	SS		Ш						/.		İ		
15.0	7-	33	Ш							⊗ 15				
	7				End of Boring									
	}					11 (.)]			
	-		-		Auger boring fu	II depth	`					1		
	}				No casing or wa	sh water used						İ		
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·		LI W		EĻ	OBSERVATIONS			•	BORING				9/2/7	
W.L.	DE.			·-	7	SOIL TESTIN		ES	BORING	3 COM Bon	APLETE	D FOREM	9/2/7 AN PL	
W.L.	Dry		_	<u>) R</u>	. A.C.R.	OF MINNES 2405 ANNAP		}	RIG DRAWN				VED WC	
W.L.)			_		MINNEAPOLIS							VED WC	. 1
 			٠.			The	Mar Var		JOB #			SHEET	ounda	rv
						The stratification between soil	ation lines types and	repre d the t	sent t ransiti	ne ap on ma	iproxii	gradua	ounda al.	'y
BBS415	76			÷							-			

						LOG OF BORI	NG NO.	23	٠					
OWN	1ER			•			ARCHITE	CT-EI	VGINE	ER			-	
	St	. L	οι	1 i :	s Park Housing /	Authority	Miller,			deste	rbecl	k, Bel	1	
SITE	32	nd	St	re	eet West and Lou	uisiana Avenue	PROJEC1	NAN	1E			·-		
L	St	L	οι	1 i :	s Park, Minneson	ta	Oak Par	rk Vi						
									UNCON	FINED C	OMPRES	SIVE STRE	NGTH TO	NS/FT.2
۱ ـ		w.	Ξ.					¥ξ		1	2	3 .	4	5
5	Ŏ.	SAMPLE	Sia	≿	DESCRIPT	TION OF MATERIAL		'nΕ	PLA	STIC	†	ATER	LIQ	UID
F.Y		S, A	Ę	VE] SS./	LIMI X—	T %	CON	TENT %	LIMI	T %
DEPTH ELEVATION	SAMPLE	TYPE	AMP	RECOVERY				UNIT DRY LBS./FT.	STANI	DARD "	N" PEN	ETRATION	(BLOWS	/FL)
kr.	- %·	F	Ś	H	SURFACE ELEVATION	N + +193.5			-			&		50
	╅.	CC	П		Dark gray brown	very silty fi	ne to			0.10	Ť	7	Ĭ	<u> </u>
	<u> </u>	SS	Ш		Dark gray brown coarse sand, to medium dense - Yellow brown si	ace of fine gr	avel -) -fill				Ļ			
	 		П		Yellow brown si	ilty fine to me	dium		1	!	-	832		
	2	SS	\parallel	Щ	sand, trace of	fine gravel -	dense -	 	-		-	1-		
5.0	7	SS			damp - (SM)	<u> </u>	/				Ø ₂₄	:		
				П				ļ.		188	1			
	4	SS	#	H	ļ.					'		120		
	□ 5	ss	Ш					}				8 29		
			П	П										
10.	0 6	SS	\parallel	Ш							8			
					`						27	'		
	7	SS	Ш		Brown fine to m	medium sand, tr	ace of			Ø/2				
			ш	-	silt and fine of to dense - damp									
	8	SS	П	П	(SP)	to moist at i	0.5' -				\ ⊗ ^{2.2}	-		
15.	ᠳ	33	Щ	Щ	()		-							
	7		ı								\			
	3		İ								'	\bigvee		
	3				·				j		İ	1		
20	9	ss								}		34	}	
20.			Щ	-					-		 	 "		
	╡.				End of Boring									
	7				Auger bering for	ll desth	i							
	7				Auger boring fu	iii aebrii]	
	3				No casing or wa	sh water used								
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	1		ك					L			<u> </u>			
	VATEF		٧ŧ	L	OBSERVATIONS	000	0 055:"C	-	BORING				9/2/	
W.L.				.R	A.C.R.	SOIL TESTING		F2	BORING RIG	BOT		FOREM	9/2/7 AN PL	·
W.L.	Dry	ΑĖ		·.r\.		OF MINNES 2405 ANNAP			DRAWN			APPRO		K
	 ,-			-		MINNEAPOLIS,	MINN. 5544	1	JOB #			SHEET		
 	 -	<u> </u>	_	•		The stratifica	tion lines	renre					ounda	rv
 				-		between soil	types and	the	transiti	on ma	ay be	gradua	al.	.,
88S415	76										 -			

						LOG OF BOR	NG NO.	24						
OWI		·	<u> </u>	is	Park Housing A	luthority	ARCHITE Miller,				 rbeck	. Bel	1	
SITE					et West and Lou		PROJECT							
3112	-				Park, Minneson		Oak Par		llage					
									UNCO	IFINED C	OMPRESS	O-SIVE STR	ENGTH TO	NS/FT.?
z		l m	1					≱π	1	1	2	3	4	5
_은	o N	ΑĀ	ā	Ϋ́	DESCRIP'	TION OF MATERIAL		7.		STIC		ATER		QIU
DEPTH ELEVATION	긜	ŝ	F	OVE				UNIT DRY WT. LBS./FT. 3		IT % — — -		TENT ^c	% LIMI — — —	-/\
밀교	SAMPLE	TYPE SAMPLE	SAM	HEC		+192.8	·	Š	STAN	DARD "			N (BLOWS	7FT)
X	<u> </u>	_			SURFACE ELEVATIO	N +				10 2		& 30	40 5	50
	\exists_1	ss		Щ	Black silty fir matter - medium	ne sand, trace	of organ	ic	1	8				
	<u> </u>				g:11			<u> </u>		/17	ļ	ļ		
	2	SS		Щ	Brown and gray fine sand - med (ML) - fill	brown silt, a dium dense – da	little mp-		1	8/12	•			
	-	_			(ML) - fill					1 1		ļ	 	
5.0	3	ss		Ш			•		1	8/16				
E]	_			Brown fine sand	d trace of si	lt and			\		-		
	4	SS	Щ	Ш	fine gravel -						020 1	1		
	<u> </u>	<u> </u>			(SP) - fill					İ	\	İ]
10.	n 5	ss		Ш							822]		
				\exists	Black silty fir	ne sand, trace	of fine			 	<u> </u>		+	
	6	ss		Щ	gravel and orga dense - damp -	nic matter - V	ery		1			l	`	
	_		''	+	dense - damp -	(511)			 	 	 	\- <u>-</u>		
<u></u>	+-		Ш	тН							8-	-	7	
15.	σ 7	SS	Щ	Щ							125	1		
	7				•				1		Y			
		}			Brown fine san	d, trace of si	lt and							
					fine gravel - i		damp							
20	0 8	ss			to wet at 18.5	· - (SP)			İ	8/2		<u> </u>		
	<u> </u>		П	"	•					11				
	3									11		-		
	3													
	9	SS	Ш	щ	Gray brown fine	e to medium sar	nd, trace		 	io		 		
25.		33	Щ	Щ	of silt and fir	ne gravel - med	lium		į	"				
	1		\square	\dashv	dense - wet -	(54)	:		-			ļ		
									1		1			
]_				Gray very fine		nedium				1.0			
20	0 10	SS		Щ	dense - wet -	(ML)					\ 25 ●⊗			
<u>. المحال</u>]	-	۳	\dashv	End of Boring	· · · · · · · · · · · · · · · · · · ·	<u>'</u>		1-	 			1	
					Auger boring for									
	7				No casing or w	ash water used								
<u> </u>	WATER				OBSERVATIONS			·	BORIN	L G STAR	TED	L	8/31	777
W.L.		18		WS		SOIL TESTIN	G SERVIC	ES .		G COM	IPLETE	D	8/31	
W.L.			B.C			OF MINNES	OTA, INC.		RIG	B-50		FOREM	17	CK
W.L.					AB	2405 ANNAP MINNEAPOLIS,		1	DRAWI	400		APPRO	VED W	
DCI		14	. 4	<u>'</u>	6 Days AB		·	·	JOB #		920-E	SHEET		
		<u> </u>				The stratification between soil	tion lines	repro	esent i transit	the ap	proxin	nate t gradu	oounda al.	ry
BB5415	76				 	Detween Son	Typos and				., 50	3.444		

OWNER				LOG OF	BORI								
OWNER St	. L	.ou	is	s Park Housing Authority		ARCHITE Miller				erbeci	k. Be	11	
				eet West and Louisiana Av				-					
				Park, Minnesota		0ak Par							
	Τ	П	Ň			·		UNCO	NFINED (COMPRES	SIVE STR	ENGTH 1	TONS
2	ш	1			•		¥ε		1	2	3	4	 5
- F S	ΜP	ŏ	RΥ	DESCRIPTION OF MAT	ERIAL		₩Ę		ASTIC		ATER		QUI
DEPTH ELEVATION SAMPLE NO.	TYPE SAMPLE	띪	OVE	•			UNIT DRY LBS./FT.	X-	IIT % — — -		TENT	% LIN	11T
AM ELE	Z P	SAM	띪	<u> </u>			N _N	STAN	IDARD '	'N" PEN	ETRATIO	i (BLOW	
$X \square$				SURFACE ELEVATION +	191.7		<u> </u>		10	20	⊗	40	50
1	SS		Щ							® 27	-		
	-		Π	Gray brown silty fine to trace of fine gravel - n				1					
2	ss	Ш	Щ	damp - (SM) - fill	ned i dii	, dense			8011]	
5.0 2	-		n	· · · · · · · · · · · · · · · · · · ·				85	-		+	 	+
3.0 3	SS	Щ		Brown silt, a little fir few thin (1/16") seams of			а	ľ		\]	
4	SS		Ŧ	loose - damp - (ML) - fi		3011		85	1				
	33	Ш	_						<u> </u>	1 '	ļ	ļ	1
	-		Ш	Gray brown silty clay, t sand, with rust brown di stiff - (CL)	race scolo	of fine rations	-		12 x				
10.0 5	SS	Щ	7						1,90	[+
6	SS			Gray brown silty fine sa small clay lumps - loose									
B	33			(SM)	. WC			8	9			_	
			Π	2	1 -	,		1					
15.0 7	SS			Gray fine sand, trace of wet - (SP-SM)	SIIE	- 10056	_	88		1			
		+	4					<u> </u>	-				+
						İ			1				
		-	П	•					\				
20.0	SS		Щ			-		1	812				
				Brown fine to medium san	nd tr	ace of				•			
				silt and fine gravel - m								'	
25.0 9	ss			wet - (SP)				}	8 5				
		7	7			j]] }		
						.]		Ì					
				•									
20: 0 15		Ш				, I			 ⊗13				
30.0 10	55	Щ	-	End of Boring					8	 	 	 	 - -
			1	Auger boring full dpeth		-		0*					J
				No casing or wash water	used		•		CAL	RKYL	ED PE	NE IRO	ME
	ĻĖ	VE		OBSERVATIONS		`` <u>-</u> L		BORING	STAR	TED		8/31	
W.L.	16.			SUIL II		SERVICE		BORING	B-5			8/31	<u>/7</u> BT
W.L.		3.C.	H.			OTA, INC. ILIS LANE	1	RIG DRAWN		ICK	FOREM APPRO		MC BI
	61 (6 1	Da	•		MINN. 55441	1	JOB #			SHEET		
			_			ion lines	repre	sent t	he ap	proxin	nate b		ıry
				betwee									-

					_	LOG OF BOR	NG NO.	26]
OWNE			•				ARCHITE								1
		_			Park Housing A	· ·	Miller,			leste:	rbeck ———	, Bel	· · · · · ·		
SITE	_				et West and Lou Park, Minnesot		PROJECT Oak Par								
			П				· · · · · · · · · · · · · · · · · · ·		UNCON	FINED C	OMPRESS	SIVE STRE	ENGTH TO	ONS/FT.	1
2	١.	щ	٠				•	¥ω Ť.	,	!		3	4	5	
_E	Š.	SAMPLE	ă	Ä	DESCRIP	TION OF MATERIAL		ξĖ		STIC		ATER		UID	1
DEPTH	PLE	ŝ	급	S				UNIT DRY WT LBS./FT. 3	X-	IT % 		TENT % ●	6 LIM	IT % -/\	
22	SAMPLE	TYPE SAMPLE	SAM	REC	 			37	STAN	DARD "		ETRATION	BLOWS	S/FL)	
X				- 1	SURFACE ELEVATIO	N→ +190.9			1			8) 30 4	10 :	50	
	1	ss		ii	Dark gray brown trace of fine o (ML-CL) - fill	ravel - loose	- moist	-	88	•			.		
				П	(ML-CL) - fill Brown fine sand	l trace of sil	t and fi	ne			}	 		 	1
	2	SS		Щ	gravel - loose	- damp - (SP)	- fill		/ ⁸ 7				ļ.,		
5.0	3	SS	П	П	Dark brown fine and gravel, wit loose - damp -	sand, trace of the silt lumps	f silt very	l	6 2						
		22	Щ	Щ	loose - damp -	(SP-SM) - Fill			82/6	,,					
	4	SS		Πİ	Black sandy si matter - very {	it, trace of or loose - damp -	(ML-OL)/		86		*	1	1		1
	-	33	Щ	ш	Brown silty cla				l j				ļ		j
	5	SS			very stiff - ((ė,						
10.0	-				Dark gray brown		and -		'						
<u> </u>	6	ss		$\ $	loose - wet -	(SM)			8					,	
					·				8				<u> </u>		
	7	SS								`®13					
15.0		33	"	٦											
17.0	8	SS	Ш	П						Ø14					
	-		Щ	$\ddot{\dashv}$					<i>/*</i> *						
					Gray brown to										
					sand, trace of								Ì.		
20.0				П	trace of silt (SP)	- mearum derrse	- wet			16			,		
	9	SS	Ш	Щ						8					
<u> </u>										/					1
				\dashv						1					.
25.0											\mathbb{N}				
	10	SS		${ m I\hspace{1em}I}$				-:			822	Ì			
			"	┪	Gray fine to co	parse sand, tra	ace of			,	/·				'
					fine gravel and			-			1				
20-0				ı	wet - (SW)										
30.0			╗	Н		,				1					
31.5	11	SS	Щ	"	F	 	· · ·			178		יא פפ	En - 111	NETRO	ur = -
	·]				End of Boring Auger boring to	15 ¹ . wash bor	ina bela	w 15	, 15	of		i brai sing		NEIRU	16.16
				L	OBSERVATIONS	- , :==::			BORING		<u> </u>		9/2/		1
W.L.						SOIL TESTIN	G SERVIC		BORING				9/2/		
W.L.						OF MINNES 2405 ANNAP	· .		RIG CH	1101		FOREM APPRO	717	JD WCK	
	15.	31.	6	D	ays AB	MINNEAPOLIS,	· .		JOB #	000)20-В		VED	,	
						The stratifica	ition lines	repre				SHEET	ounda	rv	
		•		-		between soil									.
88541576	5 .			-					,			 			

LOG OF BORING NO. 27

						LOG OF BO							
OWNE		Lo	u i	s	Park Housing A	uthority	1	r, Han			eck,	Bell	
SITE					t West and Lou		1	CT NAM					
	٥t.	Lo	U 1	5	Park, Minnesot	a	Uak P	ark Vi					
l								UNCON	FINED CO		YE STI	RENGTH TO	N9/FT. =
8	호	SAMPLE	DIET.	-	DESCRIPTION	OF MATERIAL	\$0.		1 :	t :	•	1-	P
SEPTH ELEVATION	SAMPLE	SA	뾔	Š	DEJORIT 110H	or material	UNIT DRY 1 LBS./FT.		sπc ir ≸		TER ENT %		iulo IIT %
DEPTH	SAM	TYPE	BAMP	F			2 2				TRATIO	N. (BLÓWS	<u>A</u> ,
Image: second color					SURFACE ELEVATION	+190.7]				9		50
	,	55	П		Brown, black,	and dark brown			Ø 14	<u></u>		Ť	Ĩ
	1	SS	Щ	Щ	silty fine to				Î	}			
	2	-	П	П	trace of fine clay lumps - m	gravei with edium dense - /			\$13				
	2	SS	Щ	Ш	\moist - (SM-M Brown fine to			İ .	/		Ì		ł
5.0	3	55	Ш	П	trace of silt with lenses of	coarse sand, and fine gravel brown silty	1	8,		ļ	l	İ	
	1_	33	Щ		fine sand, (SM) - loose -		18			•	1	
	t T		П	П	damp - (SP) -	7111	i	85				1	ĺ
	4	SS	Щ	Щ	Brown silty f	ine sand, trace I - very loose	_	Ĭ					<u> </u>
	5	SS		I	wet - (SM) -	fill		\$ 2/9"].	
		SS	Щ	Щ	Black organic	peat - Pt)		Ø 2/4"					
10.0			Ħ	M	Dark gray silt			· `&6	-	•′′			
	6	SS	Щ	끸	soft - wet - (]
二	_	•	Щ		/ with trace of	ty sandy clay. rotten vegeta n seams of blac	ion	13%	*	1		<u> </u>	<u> </u>
	7A	33 SS	H	$\ $	peat - stiff	- (CL) /	1		8/2			1	
15.0	ŀ	H	Щ	쒸	Brown gray sil trace of fine	ty fine sand gravel and rott	en		1	,			
15.0			Ш	1	vegetation - m Wet - (SM)	edium dense -	 		,		<u> </u>		
	8	SS	Щ	_	(311)		}	1	\ "	į		İ	
	1					•	1		\		1	-	ļ
				ļ		٠			\ \				
70.0			H				}						
20.0		-	Н	Π			ļ	1	/8 es				
	9	SS	Ц	Ш			ļ		13 89		·		
					*	•		•			•	1	
				-	Gray fine to c	oarse sand,	ŀ	•					l
77 0			Ų		some fine grav silt - medium						<u> </u>]
25.0			Ш	П	(SW)	aciije wet -			 ⊗ 13		İ		
	10	SS	Щ	Щ					ارات			1	}
											1	1	1
											ļ]	
30.0											1	1	
			III	П					815				
	11	SS	Щ	Щ		٠.	1		Ĭ,				'
												1	1
							1					-	1
25.0			l				,				1		
35.0		-	Ш	П	`				ار ا				}
36.5	12	SS	Ш	Щ		<u> </u>			⊗ 15			1	
					End of Boring Auger Boring t	o 12.51							
			H		Wash boring be	low 12.5'							
			H		15' of NX casi		usad						
-	TEP		<u> </u>	_	BSERVATIONS	C OFFICING MUO	iasea	<u> </u>	BOOING	STARTE		9/1/	77
W.L.					.5' WD w/augers	SOIL TESTING	SERV	ICES		COMPLE		9/1/	
W.L.	9.5	•	.c.	R.	A.C.R.	OF MINNESO 2405 ANNAPO	OTA, INC.		RIG	CME-7	5		JD
W.L. WC I		21	7	<u>.</u>	ays AB	MINNEAPOLIS,			DRAWN		-	APPROVED	WCK
88S 715	_	٠.	0	U	sys AD	<u> </u>			♦ 80t I	<u>90920-</u>	B 1	SHEET	

						LOG OF BO							
OWN					Development 1	V		TECT - E					
`	38				Park Housing A					Wester	beck,	, Bell	
SITE	-				et West and Lou			CT NAM	_				
	35	. L(ou i	S	Park, Minnesot	a	vak	Park V					
1	ł		Н	ı				UNCON	FINED CO	DMPRESSI	VE STR	ENGTH TO	(S/FT. *
٫	ا ا	TYPE SAMPLE	إرا				j.		, ;	2 1		4 1	,
DEPTH	SAMPLE NO.	≩	8	RECOVERY	DESCRIPTION	OF MATERIAL	. ≥ F	PLA	STIC	WA		 	UID
DEPTH	: ₹	Š	긜	<u>S</u>			UNIT DAY LDS./FT.		п 7	CONTI			7 %
	3	17 2	3	=			3 3	-	← -) · · · · · · ·		Δ. Ι
<u></u>	4	[]	11	ľ		- +190.2			- UNDAND		HATIOI	N (BLOWS/	
\bowtie	 	SS		╁	Brown Silty 1	· · ·			0 2	10 3	<u> </u>	40 5	•
	11				with clay lump				168-			İ	
<u> </u>	2_	SS		Ц	dense to dense			l]	_	≥ 8 ₄₅	
5.0	13	SS	mt	4	moist - fill			1	20	h		"	
F-	4	-	m	1				2⊗-					
	1-	SS		-	NOTE A	•		85	ĺ]. [1	
10.	0 3A	35 55,						39.7	4.			+	
	6	33	m	=	NOTE B			85	1	1		1	
	=			7	Black organic	silty sandy		86				1	
15.	7	SS	ᄣ	#	Black organic clay, trace of soft - wet -	fine roots -		800	1	•			
	<u> 8</u>	SŦ	m.	ΠŤ	TAIL NG	`						1	
<u> </u>			Щ	7	Ceny of the en-	alaway eller]]		1	į
	ゴ	l :		ı	Gray silt to o				1]		1	
20.	4	51	₩	╢	36111 " (FIL-C)				1]] .	i .
	1 9A	SI	Ш	Ŧ	Gray silty fir	e to coarse						1	
F	10		M	Ŋ	sand - medium	dense - wet -		1	1	824		}	
25.				Ī	(SM)	· · · · · · · · · · · · · · · · · · ·	ļ			1024		٠,	
	- 11	ŞS	Щ	4	Gray fine to m				8' /18			1	
	1	i		1	trace of silt dense - wet -			}	/"			1	
30.	d		Н	+	Gray sandy si			 	6.4.				
	124	<u>22</u>	₩	Ħ	fine gravel -	medium dense -	-	 	812	 		+	
==	7	1	11	۱]	wet - (ML)	/			1				
76	7		П	1	Gray fine to r	medium sand.		}					
35.		SS	 	Н	trace of silt]	i `	821			
] ''	33	P1	4	dense - wet -				j	\	•	ì	
			1+	╅	Grav very fine	to fine sand,				 `		 	
40.		ee-		┨	trace of silt			ļ		126			
<u> </u>	14A	55 55,	Щ	Ц	(SP). Gray silty san	ndy clay -			•	<u>⊗</u>			
	7		11	1	stiff - (CL)	,,				11/6"		-	
		-		t	Gray fine to o	coarse sand,				ī			
45,	0 15	SS		Ц	trace of silt	- medium dense	-			822			
	1_		Ц	1	wet - (SW)					١.			
50	┧	l		1	Gray fine to m	nedium sand,				1/ 1		1	·
	16	SS	trib	I	trace of silt wet - (SP)	- medium dense	-		1	ฆ่น			
51.	되	_	Πf	†									
	7			١	End of Boring				1				
	-		П	1	NOTE A - Brown	n fine to coars	a.		·				
	7	l	Ιĺ	İ		f silt, with sm		1	· ·]		1	
	<u> </u>		П	1		clay and topso			ſ			1	
	7		П	1		to loose - damp			!			1	
	∄	l		ļ	to moist - (SI				}	j i		1	
	-			1	· ·	fine to medium			l]		1	
	<u> </u>	l		1		f silt and fine		J					
	7	1	П	1	grave! with sr silt seams -	mall irregular Loose - wet -			}				
	1	1	Н	1	(SP) - probab				1				1
<u> </u>	-		11	1	, , probab	••••							
				1	Auger boring	to 81			}				
1	-1]	11	Į	Wash boring be	elow 8'		i 1					
	1		11	1	10' of NX cas]			i
-	-	ľ	П	I	51.5 feet of l	Revert drilling	mud t	sed	į				1
	7	1		Í]] [
	┨			1]				
	<u> </u>	<u></u>	H	1						<u> </u>		. 1	
W					BSERVATIONS	CON TECTION	CEDI	VICE C	BORING	STARTE		8/31/7	
W.L.			0 8	<u> </u>	WD w/augers	SOIL TESTING			BORING	COMPLE	TED .	8/31/7	7
W.L.	10.	9).Ç.	R.	A.C.R.	OF MINNESOTA			RIG	#8	E	OREMAN E	
W.L	<u> </u>				· ·	2405 Annapo	115 Lá	ine	DRAWN		_	PPROVED	WCK
DC I	8	٠8،		<u> </u>	Days AB	Minneapolis	, MN	5441	10B +	90920	-B S	HEET	
	<u> </u>					The stratificat	ion l	ines r	eprese	nt the	аррг	oximate	bound-
						any hatyaan co				• •	'	_	

ary between soil types and the transition may be gradual.

						LOG OF BORI								
OWNE			•				ARCHITE							
L					Housing Author		Miller, PROJECT			leste	rbeck	, Bel	<u> </u>	
St	32r	nd i	St Pa	re	et West and Lou , Minnesota	isiana Avenue	Oak Par							
130.	COU	1 3	Γ		, militesoca		Uak Fai	K - V I		FINED C	OMPRESS	IVE STRE	NGTH TO	NS/FT?
			١.					ن ب	-			о——		
Z O	Ö.	<u>P</u>	JIST		DESCRIPT	ION OF MATERIAL		∀. 3.	<u> </u>	1	2 	3 '	 	5
HAY TAY	щ	SAN	Щ	Ē		`		DR S./F	LIM	STIC IT %		NTER FENT %		UID IT %
DEPTH ELEVATION	SAMPLE	TYPE SAMPLE	MP	ပ္ပ	·			UNIT DRY WT. LBS./FT. 3	X-	 DARD '''	(N" PENS	З — − Tration		$-\Delta$
la -	Ś	7	ŝ	æ	SURFACE ELEVATION	+189.6		ر	I -			8)		50
	1	CC				 			+	⊗ 11		1		
	1	SS	Щ	H	Brown fine to	coarse, trace	of silt						•	
	2	SS	li	Щ	and fine grave	l - medium den	se to		6	9				
		33	11		dense - damp -	(SP) - possib	le fill							
5.0	3	SS	ì	۳					6	9]	
			11		Gray brown and	grav silty cl	av -		1	<u> </u>		 		
	4	SS			trace of fine				88	0*	•			
			1						1		100		,	
10.0	5	SS		Ш	Yellow red to	yellow brown f	ine			\	19		-	
					sand, trace of	silt and fine	gravel		6/					
	6	SS.			medium dense t moist at 13.5'		to		8.8		Ì	l	,	
	-	-	17			(31)								
	7	SS	П	円					85					
15.0	_	33	Ш	H										
					End of Boring				0*					
					Auger boring f	ull denth				CAL	I BRA	TED PI	ENETR	PMETER
					Adder por mg r	arr depen	·				1			
					No casing or w	ash water used] .				1	
					•									
													ļ	
				1										
						•]					
		Ì							[j .
	- 1				•				1		,			
	- 1						-				'			
	ATER				OBSERVATIONS				BORING			N 7-	1/77	·
W.L.	 -	Dry	_		A.C.R.	SOIL TESTIN		ES	BORING RIG		APLETE!	D 8/3 FOREM	31/77	
W.L.		!	<u>3.C</u>).R.	A.U.N.	OF MINNES 2405 ANNAP		ļ	DRAWN			APPRO		WCK
DC I	11.	81	6	Da	ays AB	MINNEAPOLIS,	MINN. 55441	1	JOB #		20- D	SHEET		
						The stratifica	tion lines	repre	esent t	he ap	proxin	nate b	ounda	ry
PDC 4157						between soil	types and	the	transiti	on ma	y be	gradua	ıl.	
BBS4157	·				•									

							LOG OF BOR								
OWI	NER		c 4		1 -	uic Dank Hausi-	na Authority	ARCHITE				rho-1	והם	1	
SITE	=					ouis Park Housin		Miller PROJEC			Me2 Le		, bei	<u>'</u>	
3111	-					treet West and ouis Park, Minne		Oak Par							
-	T	7		Γ				<u> </u>		UNCON	IFINED C	OMPRES	SIVE STRE	ENGTH TO	ONS/FT.2
-		١	тi	Ŀ					¥ε	-	1	2	3	4	5
DEPTH	2	2	MP	SS	≿	DESCRIPT	TION OF MATERIAL		UNIT DRY 1 LBS./FT.		STIC		ATER		ויי
PTH EVA	u	ן	S	급	OVE				T D BS./		IT % 	CON	TENT % ●	6 LIM 	
무료	MV	SAMPLE	TYPE SAMPLE	SAM	REC	· · · · · · · · · · · · · · · · · · ·	1100.0		3			N" PEN	ETRATION		
A						SURFACE ELEVATIO	+189.2		ļ <u> </u>	1	T			10	50
	3_	1	SS		Ш	•				12	8				
	_	-		III	Ш		wn silty sandy brown silty fi			12	8		1		
	_	2	SS	Щ	Щ	stiff - (CL)		,,o sand			1				
5.0	5	,	SS		Ш		•	•		85				-	
		긬	33	Ш			· .					1			
	\exists	4	SS			organic matter	ay, trace of s - soft to sti	and and ff - (Cl	-OL)	84	l	•			
										1-	*	1	-		
10.	0	5	SS		Щ	Blue gray silt	y clay, trace	of		87	0*	•			
			•			fine sand - st	iff - (CL)		·			1	ļ		
		6	SS			·		•		85		, •			
-	\pm	7				Dark gray brow	n silty sandy	clay -		 `	<u> </u>	/			
15,	0	7	SS			stiff - (CL)	in Sivey Sundy	0107			è	21			
		7		-	Н	End of Boring				*	CALI	BRATE	D PEN	ETROM	ETER
						<u> </u>									
	3					Auger boring f	ull depth								
	$\exists \downarrow$					No casing or w	ash water used			1					
	╡ `					•				}					
	3														
	=		Ì						-						
	3	Ì			-										
<u> </u>	#			į											}
						•						:			
		1													
	=	1			-			ľ				1		,	
			ļ									:			
	7			1											
	7	\cdot		-				·							
	NATE					OBSERVATIONS				BORING	STAR	TED		8/30,	. ,
W.L.			Dry	_		A.C.R.	SOIL TESTING		ES	BORING RIG		7 A T	D FOREM	8730,	/77 PP
W.L.						A.C.R.	OF MINNESC 2405 ANNAPC	LIS LANE		DRAWN			APPRO\		WCK
DCI		1	1.2	7 1	(Days AB	MINNEAPOLIS,	MINN. 55441	•	JOB #		0-B	SHEET		
					-		The stratificat	tion lines	repre	esent t	he ap	proxin	nate b	ounda	ry
BBS415	76		<u></u>				between soil	types and	the	transiti	on ma	y be	gradua	d. ·	

						LOG OF BOR	ING NO.	31						
OWN				•			ARCHITE					1 5	,,	
CITE					s Park Housing / eet West and Lo	•	Mille		-	West	erbed	ck, Be	:11	
SITE	-				set west and Lo s Park, Minneso		Oak Pa			e				
-		<u> </u>		Г	<u> </u>		<u> </u>	Γ	UNCON	FINED C	OMPRESS	SIVE STRE	NGTH TO	NS/FT.2
								WT.	-	1 .		Q		
DEPTH ELEVATION	o S	MPL	DIS	 <u>≻</u>	DESCRIPT	TION OF MATERIAL		>	PI A	STIC	T w	I ATER	LIC	UID
TH.	끸	SA	빌	Ž				. DF		IT %		TENT %	-	T %
	SAMPLE	TYPE SAMPLE	AMF	S	<u> </u>		<u> </u>	UNIT DRY LBS./FT	1 '	DARD "	N" PEN	ETRATION		,
Image: second content	S	Ť	ေ	Œ	SURFACE ELEVATIO	иф - +	189.2		1	0 2		⊗ 30 4	.0 (50
	1	SS	\prod	П	Black silty fir					1 9	20			
	-		111		and twigs, with Brown fine to				 	//	ļ	 	ļ	
	2	SS	Ш	Ш	gravel, trace o			-		⊗13				
-			III		damp - (SW)	ace of organic	matter	 -	-/	/		 		
5.0	3	SS	Ш	Щ	Black silt, tra with few seams	of peat - loo	se - damp	-	87					
	4	SS	П	Ш	(MI-OI) large pottled gray bi	pieces of wood rown and brown	clayey	 	8	 	-	 		
	<u> </u>		Ш	Щ	silt - trace of (ML-CL)	f sand - soft	to stiff-		17		}			
	5	SS	П		Light brown sil				85			•		
10.0		33	Ш	-	discolorations				\			<u> </u>		
	6	SS			Light gray brow with irregular soft - (CL-ML)	wn silty sandy thin sand sea	clay, ms -		78		•			
					soft - (CL-ML)				1			 		
	7	SS		Ш			of silt -		88	Ĺ		1		
15.0			-		loose - wet -	(SP)								
	8	SS			Gray brown silt	v fine to coa	rse					831		
			11		sand, some fine	to medium gra	Y Control of the Cont		ļ		/	1		
					medium dense -	wet - (SM-GM)			1		/		·	
20.0			_								'	-		
20.0	9	SS			Gray fine sand	a little fin	e to				® 22			
)	33	Ш	=	coarse gravel,						/			
					medium dense -					1				
												ļ		
25,9			П	П						1				
	10	SS		Щ						161				
			Į		Gray fine to co silt and fine o			ļ		\				
					wet - (SW)	, ave. meara				. \				
30.0				-							\			
31.5		??	$\ $	Щ							822			
21.5	' '	-	Щ		End of Boring				 					
					Auger boring to	12.5', wash l	poring be	low	2.5			of NX		ng us 2/77
W.L.	AIEH			<u>L</u>	OBSERVATIONS 'S	COH TECTIA	e ernuei		BORING			<u>n</u>		2/77
W.L.	···-·					SOIL TESTIN		29	RIG C			FOREM		JD
W.L.		91			Days AB	2405 ANNAP	OLIS LANE	. I	DRAWN	1.14	СК	APPRO	/ED	WCK
						MINNEAPOLIS	, MINN. 5544	<u>' </u>	JOB #	9092	20-B	SHEET		
						The stratifica	ation lines	repre	sent t	he ap	proxin	nate b	ounda	ry
BBS 4157	5 .					between soil	types and	tne i	ransiti	on ma	y De	gradua	.	

LOG OF BORING NO. 32

1						LOG OF BO			32				
OWNI	St.		_		Park Housing Au		Hill	er, Hai	nson,		beck,	Bell	
SITE					t West and Loui Park, Minnesota		•	CT NAM Park V					
								UNCON	FINED C	MPRESS	VE STRE	нотн ток	15/FT. *
×	ġ	1	١,	,			ţ.			2		11	
DEPTH ELEVATION	SAMPLE NO	SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION	OF MATERIAL	UNIT DRY V		STIC .		TER ENT %	LIG	
DEPTH ELEVA	× ×	TYPE	A W	NEC.			Log Chit	>			 -		Δ
k-	↓"	-			SURFACE ELEVATION	+188.9	_	l			}	(BLOWS/I	——— [
	1		Н	H	Black silty fir pieces of aspha		 	 '	0 2		<u> </u>	0 5	
<u> </u>	1	SS	Ш	Щ	dense - damp -	ait - meaium (SM) - fill			/98				
\vdash	}—		Н	Н	Gray brown fine	···				\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		 	
-]2	5S		Щ	sand, a little	fine to coarse		1		⊗z3			
—				=	gravel, trace (Vense - damp (ļ	2/1	ļ	ļ	ļ	
5.0	3	ss	III	Щ	Brown fine to				012				
			Ë	-	trace of silt				/			1	
	4	ss	Ш	Щ	medium dense -	damp - (SP)			10		ł		
			۳	Н				L		<u> </u>			
	5	ss			Horizontally la	eminated seams with few sand		10 0	ੂੰ				
10.0	<u> </u>		Щ	H	seams - stiff				1				
F	T		\prod				1		812				
	6	SS	Щ	4			1	İ]				
	1			,,							1		
	,	ss			Brown fine san	d, trace of			812		·		
15.0	 	7.7	۳	H	silt, with few	seams of	1	1					
<u> </u>	1		Ш		horizontally 1 from 10' to 13				813	1			
	8	SS		. 1	dense - damp c				١ ١			}	
F	$\{ -$				wet at 14' - (1		
	}							1]		
	}	-	H	Ц			ļ	-	 			 	
20.0	1	<u> </u>			Gray brown fin	e to medium]	1		
	9	ss		Щ	sand, trace of	silt and fine			/8 ⊗				
	1		۳	H	gravel - mediu (SP)	m dense - wet	Ì	1			[:	
	1				(37)]						
	 		L	Ц			ļ	 	<u> </u>	<u> </u>	 	 	
25.0	1		L	Ш			[]	1	[ļ
	1,0	ss		Ш			1		8015				
	 		Щ	Н	Brown fine san	d. trace of]	1					
	1		ı		silt, trace of	fine to	}		1/				
	}				coarse gravel wet - (SP)	- medium dense	-	1					
30.0	}			H	wet - (3r)			1	1/				
	\top						1		8 0,#	}]		,
<u> </u>	₽-	-	Ш	鬥							}		
	1								`	\	ľ		
	1			П	Gray brown fin		<u> </u>						
75.0	1			Н	sand, a little	fine to trace of silt		1			.		
35.0	+-	_	II	щ	coarse gravel, dense - wet -		1]					
36.5	_		Ш				L					39	
	1				End of Boring Auger boring t	0 12 51		o*				'	
<u> </u>	-				Wash boring te				CALIB	RATED	PENETR	METER	
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	1		L	Ц		evert drilling	mud u	sed.	<u> </u>		!	71777	
	TER	LEV	EI IS	<u> </u>	DBSERVATIONS	SOIL TESTING	QED!	ILE6	_	STARTE		////// /2/77	
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W.L.						2405 ANNAPO MINNEAPOLIS,			DRAWN	UFP		PROVED	WCK
WCI		1' (6	Da	ys AB				J08 +	9092	0-B si	EET	
BBS 715	7.5										_		

					LOG OF BO							
OWNE	St.				Park Housing Authority	Mill	er, Ha	nson,		beck,	Bell	
SITE	32n St.	d \$ Lo	t r u i	ee s	et West and Louisiana Avenue Park, Minnesota	ı	ect nam Park V					
				$ \cdot $			UNCON	FINED CO	PRESS	VE STR	INGTH TO	NS/FT. ²
DEPTH ELEVATION	SAMPLE NO.	TYPE SAMPLE	SAMPLE DIST.	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT. 3	LIM	STIC	CONT	TER ENT %	LIM	ivid IT %
∇		-	1		SURFACE ELEVATION + 188.1	1	1			3	(BLOWS/	
	1	SS	III	П	Brown, dark brown, and black	1		0 2	26⊗	<u>•</u>	40 :	
	2	55	Ī		silty fine sand, with small lumps of clay and topsoil -			·	1	30		
5.0	2	SS	iii	П	medium dense to loose - damp		}	b"				l
	4	SS	iii		changing to wet at 8' - (SM)		<i>5</i> ∕				1	
	5	SS	-		Black silty sandy clay,		86	,			}	İ
10.0	6	SS	-		trace of rotted vegetation - stiff - (CL)		88	•			T	
			,		Black and gray sandy clayey	-	86	<u> </u>	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	<u> </u>	 	
	7	SS	Ш	H	silt, trace of fine gravel - soft - wet - (ML-CL)	 	1		-		1.	
15.0	8.	ss	Щ	Щ		nd d	. 6	9] . :			
		Ŀ	L		with thin irregular seams of gray clay - loose - wet - (SM)	1	}	١			1	l
20.0	9	ss	П		Gray fine to medium sand,			8/3				
	7	22	Ш	Ħ	trace silt and fine gravel	-	1					
25.0					medium dense - wet - (SP)		1	1				l
	10	SS	Π	囯				188				
								\				
30.0		_	Ļ	,,	-		1 .	\	20		1	
	11	SS	Щ	門	,		' '	· /				
		\vdash	H	Н		1		1				<u> </u>
35.0	12	SS		Ш	,			168				
			Γ	П	Gray fine to coarse sand,			\				
40.0	<u> </u>	_	١,	Ш	trace silt and fine gravel	<u> </u>			26			1
	13	SS	۳	Ħ	medium dense - wet - (SW)	1			🔗			1
1.6.							1			-		. .
45.0	14	SS	IT	Ш					824			
		=		П	Brown very fine to fine sam				,			
50 0	, -			Ш	trace silt - medium dense · wet - (SP)	1	1		/		1	1
51.5	15	SS	Щ	Ħ	wet - (3r)	 	 	ļ ⁹	20	<u> </u>	 	<u> </u>
				П	End of boring		{					
<u> </u>					Auger boring to 10 feet	1	Į		٠ - '	Ì		
		1			Wash boring below 10 feet							
		1			12.5 feet of NX casing used 51.5 feet of Revert drilling							
	ľ				mud used		}				1	l.
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WA	TER	LE	/E.	L (DESERVATIONS COLL TECTIN	n ern	VIOCO	BORING	STARTE		1-77	
					WD w/augers SOIL TESTING	b 9FW	TIUES		COMPLE #8		9-1-77	VH
W.L.		<u>.9'</u>	DC	.R.	7 ht 6 days AD			RIG	WCK		OREMAN F PPROVED	
	<u>l</u>			_	7.4 6 days Ab 2405 Annap Minneapolis,				90920-		HEET	~~.
			_		The stratifica	tion !	lines r					
Ł			-		ary between so							
					·							

						LOG OF BO	RING	NO.	34					
OWNE		. L	ou	i s	Park Housing A	Authority		er, Ha		E R Wester	beck,	Bell		
SITE	-				et West and Lou Park, Minneson		1	Park \		 }		-		
DEPTH ELEVATION	SAMPLE NO.	E SAMPLE	SAMPLE DIST.	ECOVERY	DESCRIPTION	OF MATERIAL	UNIT DRY WY. LBE./FT. 3	PŁA LIM	FINED C	2 	IVE STRI		NS/FT. *	
	SA	٤	3		SURFACE ELEVATION	- +187.6	3 -	87/	ANDARD		TRATION	(BLOWS)	/FT.)	
5.0	2 3	\$\$ \$\$ \$\$			Dark gray brow sand - medium (SM) - fill Gray brown fir sand, trace of	n silty fine dense - damp	ps	J_{\otimes}	15 -	® ²⁴	o _⊗33	40 !	50	
	5	55	H			idense to loos it 8' - (SP) -		56		ļ		ļ	<u> `</u>	3079
15.0	6 7 8	55 55 55			Black fibrous			1/4" \ /4" \	8 12 0 10					286 % 201 %
	Ů	33	Ľ		Horizontally I clayey silt -	soft - (ML-CL)	_	Ĭ		ļ		ļ	ļ	
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25.0	10	22		<u>I</u>	Gray silty fir sand with irre and lenses of clay - medium (SM)				18 8			,		-
30.0	11	SS				ine to medium silt - medium (SP)				822				
35.0		SS		I	Gray brown fir of silt - med wet - (SP)	ne sand, trace ium dense -				В Ч				
40.0		SS							18 8					
45.0	14	• \$\$			Gray clayey sa dense`- wet -						30			
50.0 51.5		65		П	Brown fine to a little fine gravel - trace medium dense -	to coarse				27 8			,	
					End of Boring									
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DEPTH	7	3	SAMPLE DIST	OVE.	DESCRIPTION	OF MATERIAL	UNIT BRY		STIC		TER ENT %		iuip irr %	
DEPTH	SAMPLE	TYPE	ž	ĕ			I S)	←)		Δ	
স	1	[-		lt	SURFACE ELEVATION	+ 188.6	7	-	ANDARD		8		PTJ	
	1	SS		H	Black and darl	brown silty		9,8		10 3		10 :	<u> </u>	
	2	SS			sandy clay (Cl fine sand (SM)	_) and silty - loose - da	amb -	85						
5.0	3	22		固	fill			83					1	
	4	SS			Gray silty cla of brown silty (CL) - fill	ay with seams' / sand - soft	/	853	<u>k</u> .		}			
10.0	ŠΑ	§§	П		(CL) - fill Dark brown and	black fibrou	ıs	8.8					 	İ
70.0	6	SS	П		peat -{Pt}		1	2	\⊗13					● 301 ^G / ₂
	7	SS	I	回	Dark gray to b	lack silty fi	П	<u> </u>	8)II ⊕ -					
15.0					sand, trace of gravel - loose	f fine to coar e - wet - (SM)	7		8)II		1			
	8	SS	Щ	H							1		1	ł
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25.0							·		816		1			l
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70-0									\	1		}		1
30,0		SS	Ш	Ш	Gray brown fi	ne sand, trace				€23				
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35.0	_				medium dense	- wet - (3r)								l
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45.0	<u></u>	L.			medium dense	- wet - (SP)	1	1		1 25				i
	14	SS	Щ	H						8		ļ		
50.0	1	1			Gray brown file sand, some file		1	1						/
50.0	15	SS		H	gravel, trace medium dense	of silt, wet - (SW)	İ]		8	1			
ذ. اذ				П	· ·	,						1		·
					End of Boring Auger boring	to 81				j	1	1		
					Wash boring b	elow 8'								
					15' of NX cas 51.5' of Reve		id used			1				
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9444	<u> </u>		//**	<u> </u>	DBSERVATIONS			!	BORING	STARTE	! D	! 8/31/7	7	
W.L.	<u>, , e, K</u>				8' WD w/auger	SOIL TESTII	IG SER	VICES	BORING	COMPLE		8/31/7		
W.L.	14	. 3 ').C	R.	A.C.R.	OF MINNES			RIG /	LICI	F	DREMAN	EAH	
DCT-	6.	7'-	6	Dá	ys: AB	2405 Anna Minneapolis	apolis s, MN	cane 55441	DRAWN	90920		PROVED	WCK	
┟─┴	•				•	The stratific	·						bound	! . -
		•				ary between s								
					The second secon	•					** *			

LOG OF BORING NO. 37

ARCHITECT-ENGINEER
thority Miller, Hanson, We

St. Louis Park Housing Authority Miller, Hanson, Westerbeck, Bell PROJECT NAME 32nd Street West and Lousiana Avenue Oak Park Village <u>Louis Park, Minnesota</u> UNCONFINED COMPRESSIVE STRENGTH TONS/FT. DESCRIPTION OF MATERIAL LBE./FT. PLASTIC WATER LIQUID STANDARD "N" PENETRATION (BLOWS/FT.) SURFACE ELEVATION Brown silty fine sand, with .Ø32 clay seams - dense to loose damp - (SM) - fill Blue gray silty sandy clay soft - wet - (CL) - poss. fi Gray brown fine to medium sand, trace silt - very loose -wet - (SP) - poss. fill · 109 % · 268 % Black peat - (Pt) Black organic clay - soft wet - (0L) 88 Gray silty clay, trace sand soft - wet - (CL) Dark gray silty sandy clay soft - wet - (CL) 18 [®]"/6" Gray fine to coarse sand, trace silt - medium dense - wet - (SW) 98 Dark gray silty sandy clay -soft to stiff - (CL) 35.0 Gray silty fine to medium 8 sand, trace fine gravel -<u>medium dense - wet - (SM)</u> Gray fine to coarse sand, 28 8 trace silt and fine gravel medium dense - wet - (SW) 15 SS 21 51.5 End of Boring Auger boring to 15 feet Wash boring below 15 feet 20 feet of NX casing used 51.5 feet of Revert drilling mud-used WATER LEVEL OBSERVATIONS BORING STARTED SOIL TESTING SERVICES 9-1-77 BORING COMPLETED FOREMAN EVH OF MINNESOTA, INC. #8 DRAWN WCK 8.8' 6 days AB 2405 Annapolis Lane APPROVED WCK 90920-B SHEET Minneapolis, Minnesota J08 #

5-8167

The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

LOG OF BORING NO. 38														
St. Louis Park Housing Authority Mil								TECT-ENGINEER er, Hanson, Westerbeck, Bell						
1 3/DO STREET WEST AND LOUISTADA AVENUE 1							PROJECT 0ak Pa	rk Village						
						.,			UNCON	FINED C	OMPRESS	IVE STRE	NGTH TO	ONS/FT.
z	o O	Щ	ST.					Σe		·	2	3 4	}	5
DEPTH ELEVATION		4MP	ă	RECOVERY	DESCRIPT	ION OF MATERIAL	\ \ <u>\</u>	UNIT DRY LBS./FJ.		PLASTIC WATER LIQUID				
EV	PLE	TYPE SA	PLE				·		LIMIT % CONTENT % LIMIT % X					
200	SAMPLE		SAM						STANDARD "N" PENETRATION (BLOWS/FT.)					
X "		<u> </u>		17	SURFACE ELEVATION				1	0 2		0 4	0 5	50
	1	SS		Ш	Brown silty fin gravel - medium						124			
	2	2 SS Lig			Light brown fin	-		/						
	-					ense - dry - (SP) - possible f				178			``	
5.0	3	SS	П							ģ	19			
		133			Light brown fine to coarse sand,						\			
	4	trace silt ar				fine to coarse gravel					824			
	"	33			meatum dense u	amp - (3w)				·		}		
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	╡				19' - (SP)									
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]				Gray brown cl	so fino			12/					
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W.L.	WATER LEVEL OBSERVATIONS VI Dry WD					COU TECTIV	ONI TERTIMA AFRICA		BORING STARTED 8/30/77 BORING COMPLETED 8/30/77					
W.L.					A.C.R.	SOIL TESTING SERVICES OF MINNESOTA, INC. 2405 ANNAPOLIS LANE MINNEAPOLIS, MINN. 55441		E9	BORING COMPLETE RIG B-50			FOREMAN PP		
W.L.	L Dry AB							.	DRAWN WCK			APPROVED WCK		
DCI 9.2' 6 days AB					6 days AB	MINNEAPULIS,	MINN. 5544		JOB #	9092	0-в	SHEET		
The stratification lines represent the approximate bounda						ıry								
between soil types and the transition may be gradual:														

AMERICAN SOCIETY FOR TESTING AND MATERIALS

1916 Race St., Philadelphia, Pa. 19103

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Standard Method for

PENETRATION TEST AND SPLIT-BARREL SAMPLING OF SOILS'



ASTM Designation: D 1586 - 67

This Standard of the American Society for Testing and Materials is issued under the fixed designation D 1586; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval.

1. Scope

1.1 This method describes a procedure for using a split-barrel sampler to obtain representative samples of soil for identification purposes and other laboratory tests, and to obtain a measure of the resistance of the soil to penetration of the sampler.

2. Apparatus

2.1 Drilling Equipment—Any drilling equipment shall be acceptable that provides a reasonably clean hole before insertion of the sampler to ensure that the penetration test is performed on undisturbed soil, and that will permit the driving of the sampler to obtain the sample and penetration record in accordance with the procedure described in 3. Procedure. To avoid "whips" under the blows of the hammer, it is recommended that the drill rod have a stiffness equal to or greater than the A-rod. An "A" rod is a hollow drill rod or "steel" having an outside diameter of 15 in. or 41.2 mm and an inside diameter of 11 in. or 28.5 mm, through which the rotary motion of drilling is transferred

from the drilling motor to the cutting bit. A stiffer drill rod is suggested for holes deeper than 50 ft (15 m). The hole shall be limited in diameter to between 2½ and 6 in. (57.2 and 152 mm).

2.2 Split-Barrel Sampler—The sampler shall be constructed with the dimensions indicated in Fig. 1. The drive shoe shall be of hardened steel and shall be replaced or repaired when it becomes dented or distorted. The coupling head shall have four ½-in. (12.7-mm) (minimum diameter) vent ports and shall contain a ball check valve. If sizes other than the 2-in. (50.8-mm) sampler are permitted, the size shall be conspicuously noted on all penetration records.

2.3 Drive Weight Assembly—The assembly shall consist of a 140-lb (63.5-kg) weight, a driving head, and a guide permitting a free fall of 30 in. (0.76 m). Special precautions shall be taken to ensure that the energy of the falling weight is not reduced by friction between the drive weight and the guides.

2.4 Accessory Equipment — Labels, data sheets, sample jars, paraffin, and other necessary supplies should accompany the sampling equipment.

3. Procedure

3.1 Clear out the hole to sampling elevation using equipment that will ensure that the material to be sampled is not disturbed by the operation. In saturated sands and silts withdraw the drill bit slowly to prevent loosening of the soil around the hole. Maintain the water

level in the hole at or above ground water

3.2 In no case shall a bottom-discharge bit be permitted. (Side-discharge bits are permissible.) The process of jetting through an open-tube sampler and then sampling when the desired depth is reached shall not be permitted. Where casing is used, it may not be driven below sampling elevation. Record any loss of circulation or excess pressure in drilling fluid during advancing of holes.

3.3 With the sampler resting on the bottom of the hole, drive the sampler with blows from the 140-lb (63.5-kg) hammer falling 30 in. (0.76 m) until either 18 in. (0.45 m) have been penetrated or 100 blows have been applied.

3.4 Repeat this operation at intervals not longer than 5 ft (1.5 m) in homogeneous strata and at every change of strata.

3.5 Record the number of blows required to effect each 6 in. (0.15 m) of penetration or fractions thereof. The first 6 in. (0.15 m) is considered to be a seating drive. The number of blows required for the second and third 6 in. (0.15 m) of penetration added is termed the penetration resistance, N. If the sampler is driven less than 18 in. (0.45 m), the penetration resistance is that for the last 1 ft (0.30 m) of penetration (if less than 1 ft (0.30 m) is penetrated, the logs shall state the number of blows and the fraction of 1 ft (0.30 m) penetrated).

3.6 Bring the sampler to the surface and open. Describe carefully typical

¹ Under the standardization procedure of the Society, this method is under the jurisdiction of the ASTM Committee D-18 on Soil and Rock for Engineering Purposes. A list of members may be found in the ASTM Year Book.

Current edition accepted Oct. 20, 1967. Originally issued 1958. Replaces D 1586 - 64 T.

² Hyorsley, M. J., Surface Exploration and Sampling of Soils for Civil Engineering Purposes, The Engineering Foundation, 345 East 47th St., New York, N. Y. 10017.

UNIFIED SOIL CLASSIFICATION SYSTEM

Major divisions			Group symbols	Typical names	Laboratory classification criteria					
Coarse-grained soils (More than half of material is <i>larger</i> than No. 200 sieve size)	noi	ravels no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_{U} = \frac{D_{60}}{D_{10}} \text{ greater than } 4; C_{C} = \frac{(D_{30})^{2}}{D_{10} \times D_{60}} \text{ between 1 and 3}$					
	Gravels f of coarse fraction No. 4 sieve size	Clean gravels (Little or no fines)	GP	Poorly graded gravels, gravel- sand mixtures, little or no fines	Not meeting all gradation requirements for GW Not meeting all gradation requirements for GW Not meeting all gradation requirements for GW Not meeting all gradation requirements for GW Not meeting all gradation requirements for GW Atterberg limits below "A" Inne or P.I. less than 4 Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols.					
	Grav (More than half of larger than No.	ith fines le amount nes)	GM u	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below "A" Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols					
	(More	Gravels with fines (Appreciable amount of fines)	GC	Clayey gravels, gravel-sand-clay mixtures	OZ SE					
	rtion ze)	Clean sands (Little or no fines)	sw	Well-graded sands, gravelly sands, little or no fines	Cu = Dig greater than 4; C _C = Dig XD 60 between 1 and 3 Cu = Dig Square than 4; C _C = Dig XD 60 between 1 and 3 Not meeting all gradation requirements for GW Atterberg limits below "A" line with P.I. less than 4 Atterberg limits above "A" line with P.I. greater than 7 Atterberg limits above "A" line with P.I. greater than 7 Cu = Dig Square than 6; C _C = Dig XD 60 Cu = Dig Square than 6; C _C = Dig XD 60 Not meeting all gradation requirements for GW Atterberg limits above "A" line with P.I. greater than 7 Atterberg limits below "A" line or P.I. less than 4 Not meeting all gradation requirements for GW Atterberg limits above "A" line with P.I. greater than 7 Atterberg limits below "A" line or P.I. less than 4 Atterberg limits below "A" line or P.I. less than 4 Atterberg limits below "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits below "A" line or P.I. less than 4 Atterberg limits below "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4 Atterberg limits above "A" line or P.I. less than 4					
	ids of coarse frac Vo. 4 sieve si	Clean (Little or	SP	Poorly graded sands, gravelly sands; little or no fines	So to the contraction of the con					
	Sands More than half of coarse fraction is smaller than No. 4 sieve size)	Sands with fines (Appreciable amount of fines)	SM u	Silty sands, sand-silt mixtures	Atterberg limits below "A" Limits plotting in hatched zone with P.I. between 4 and 7 are borderline cases requiring use of dual symbols. Atterberg limits above "A" Atterberg limits above "A" Atterberg limits above "A" bolo. Atterberg limits above "A" bolo.					
	(Morissr is sr	Sands with (Appreciable a of fines)	sc	Clayey sands, sand-clay mix- tures	and 7 are borderline cases requiring use of dual symbols. Atterberg limits above "A" fine with P.I. greater than 7					
Fine-grained soils (More than half of material is <i>smaller</i> than No. 200 sieve)		an 50)	ML	Inorganic silts and very fine sands, rock flour, silty or clay- ey fine sands or clayey silts with slight plasticity	60					
	its and clays	limit less than 50)	CL	Inorganic clays of low to me- dium plasticity, gravelly clays, sandy clays, silty clays, lean clays	For classification of fine-grained soils and fine fraction of coarse-grained soils. Atterberg Limits plotting in hatched area are borderline classifications requiring use of dual					
	·	(Liquid I	OL	Organic silts and organic silty clays of low plasticity	40 symbols.					
		than 50)	мн	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	PI=0.73 (LL - 20) OH and MH.					
	its and clays	(Liquid limit greater than 50)	СН	Inorganic clays of high plas- ticity, fat clays	10 CL					
	, is	(Liquid	он	Organic clays of medium to high plasticity, organic silts	0 10 20 30 40 50 60 70 80 90 100					
	Highly	soils	Pt	Peat and other highly organic soils	Liquid Limit Plasticity Chart					

STS Job No. 90920-B Oak Park Village St. Louis Park, Minnesota

RECOMMENDED GRADATION FOR SELECT GRANULAR BACKFILL UNDER STRUCTURES AND PAVEMENTS

Sieve Size	Percent Passing
3''	100
$\# \widetilde{\mathfrak{l}_{\mathbf{i}}}$	50-90
#40	20-65
#100	10-50
#200	0-8

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DEVELOPMENT OF BLOCK 3 Oak Park Village

Final plans for the development of 100 units of townhouses and apartments were approved by the Housing and Redevelopment Authority, Planning Commission, and City Council in September and October of 1977.

These plans were approved on the basis of their consistency with the previously adopted Urban Renewal Plan, Environmental Assessment and the Supplement, and the resolutions and agreements between the City, PCA, and the Minnesota Environmental Quality Board.

On December 6, 1977, the Minnesota Pollution Control Agency passed a resolution on a vote of 7-2 encouraging the City to reconsider its decision to proceed with the development on any portion of the site including Oak Park Village and the proposed extension of Louisiana Avenue.

Development of Oak Park Village is considered to be a totally separate activity from construction of Louisiana Avenue and was previously thoroughly reviewed under the environmental assessment procedures.

While it is not necessary for the Council to continue to reconsider its action on development, the developer of Block 3 has requested a definitive action by the Council on this most recent request to facilitate closing of the purchase of Block 3 and to complete financing for development of Block 3.

Since no new information has been presented which would justify delaying development; since previous environmental assessments and resolutions and agreements involving the City, the Pollution Control Agency, and the Minnesota Environmental Quality Board have allowed for development of Block 3; and since excavation of contaminated soil, as well as the construction of utilities to the site, are completed; a resolution reconfirming the City's approval of development is attached for consideration.

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RESOL	UTION.	NΩ
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RESOLUTION OF THE CITY COUNCIL RECONFIRMING ITS APPROVAL OF DEVELOPMENT ON BLOCK 3, OAK PARK VILLAGE

WHEREAS, the City of St. Louis Park has demonstrated its concern for all aspects of the City's environment including the manner in which land is developed and used and factors related to ground, air, and noise pollution, and

WHEREAS, the City undertook redevelopment identified as Oak Park Village and received approval and partial financial assistance from the Department of Housing and Urban Development, and

WHEREAS the City has taken action to eliminate and prevent blight in Oak Park Village and has provided for new park and open space and residential development consistent with approved plans, and

WHEREAS, the City completed an Environmental Assessment and a Supplementary Environmental Assessment in July of 1976 and received approval from the Environmental Quality Board of the State of Minnesota, and

WHEREAS, the development plan contained in the Supplement of the Environmental Assessment included development of the northern portion of Oak Park Village including Block 3, and

WHEREAS, the Minnesota Pollution Control Agency passed a resolution providing for the development of the northern portion of Oak Park Village including Block 3 with provisions for a stipulation between the City and the Minnesota Pollution Control Agency regarding removal of certain contaminated soils in the northern portion of Oak Park Village, and

WHEREAS, said stipulation has been executed by the parties during the summer of 1977 and the City has excavated contaminated material in the northern portion of Oak Park Village, including Block 3, and

WHEREAS, the City's Housing and Redevelopment Authority, Planning Commission, and City Council have approved and issued a special permit providing for the development of 100 dwelling units on Block 3, Oak Park Village, consistent with previously approved resolutions of the Minnesota Environmental Quality Board, the Pollution Control Agency, and the City and consistent with the adopted Urban Renewal Plan, an Environmental Assessment, and its supplement, and

WHEREAS, the City and the developer have incurred costs relating to excavation of contaminated soil, soil testing, preparation of construction plans, and insulation of utilities providing for the development of Block 3, and

WHEREAS, Phase II of the Barr Engineering Report has been prepared which does not provide any new evidence of contamination or problem with regard to Block 3 nor does it propose any further excavation or other remedial measures that would prevent development of Block 3, and

WHEREAS, on November 19, 1976, at a joint meeting of the Housing and Redevelopment Authority and City Council, the City reconfirmed its position authorizing development on Block 3, and

WHEREAS, no new evidence or information has been presented to the City which would justify the City rescinding its past approval and preventing or prohibiting development of Block 3

NOW THEREFORE BE IT RESOLVED that the City of St. Louis Park hereby reaffirms its approval of development on Block 3, Oak Park Village.

Adopted by the City Council December 12, 1977

V	Mayor
ATTEST:	
City Clerk	
Reviewed for administration:	Approved as to form and legality:
City Manager	City Attorney



DIVERSIFIED EQUITIES CORPORATION

600 Chamber of Commerce Building, 15 South Fifth Street, Minneapolis, Minnesota 55402, Telephone: 338-8572

December 22, 1977

Mayor Irving Sterne City of St. Louis Park 5005 Minnetonka Boulevard St. Louis Park, MN 55416

Dear Mr. Sterne:

I am writing to express my deep concern and distress brought about by information recently received which indicates the possibility of greater deposits of creosote on or about the site of my housing development than I had been made aware of up to this time. Also, I have recently learned that the process by which the City supervised the excavation required by the PCA stipulation which allowed the development of the Northern one half of the Oak Park Village PUD was less than thorough.

According to field personnel of the consulting engineers retained by the City for the Louisiana Avenue improvement approximately four years ago, 5,000 - 7,000 cubic yards of creosote soaked soil was excavated from the southerly portion of Oak Park Village while creating the new right of way for Louisiana Avenue and subsequently trucked to the Northern portion of the new Louisiana Avenue right of way (part of which is adjacent to Parcel 3, the site I am developing) where the material was dumped to create the embankment which now exists along the eastern edge of my site. At that time, Dave Rudberg was acting Director of Public Works.

Again, according to field personnel of the City's consulting engineer, the "Clean up" program of the Northern half of Oak Park Village which was performed in June-July of 1977 under supervision of Dave Rudberg and Dick Koppi, was haphazard. Apparently, some known pockets of creosote, particularly in the greenway area and extending into Parcel I, were covered over and not excavated to the degree required in the stipulation agreement. Also, the field personnel are not strong at all in their belief that the known pocket of creosote at the Western edge of my parcel was adequately excavated.

Mayor Irving Sterne December 22, 1977 Page 2

In addition, the soils engineer who performed our boring program informed me confidentially of one shallow pocket of creosote in the Southeastern corner of my site (see attached memo).

I must insist that it is in the best interests of the City of St. Louis Park and necessary before we proceed to construction of our family housing project, that the extent of contamination in the East bank of my parcel and the Southeastern corner be identified and removed to conform to the stipulation agreement with the PCA. Also, it is essential that the clarification of the indemnification agreement from the City which we have requested be obtained prior to construction in order to protect the project investors from future liabilities which may exist due to the careless manner in which the City staff has handled this creosote problem. I believe the City should be willing to stand behind this development fully in order to establish the viability of the rest of the parcels.

It is time for the City to recognize that this is indeed a serious matter requiring candor and mutual trust among the various concerned parties. I am anxious to proceed to construction, and I trust these matters will have your usual prompt attention leading to corrective action.

Sincerely,

TIVERSIFIED EQUITIES CORPORATION

Jon E. Dickerson, President



SOIL TESTING SERVICES OF MINNESOTA, INC.

2405 ANNAPOLIS LANE
MINNEAPOLIS, MINNESOTA 55441

SUITE 280 612-559-1900

September 13, 1977

Diversified Equities Corporation 600 Chamber of Commerce Building 15 South 5th Street Minneapolis, Minnesota 55402

Attention: Mr. Jon Dickerson

STS Job No. 90920-B

Re: Creosote Contaminated Soils Encountered at the Oak Park Village site in St. Louis Park, Minnesota.

Gentlemen:

The purpose of this letter is to confirm the telephone conversation between the writer and Mr. Jon Dickerson, on Wednesday, September 7, 1977, regarding the above referenced topic. During our field work for the supplementary subsurface investigation for this project, at the locations of borings 31 and 32, in the southeasterly portion of the site, pieces of sand and wood fibers mixed with creosote were found in the upper 18 to 24 inches of soil. Actual pieces of creosote were not found at greater depths in these borings, or in any other borings.

We wish to bring this matter to your attention, so that it can be dealt with properly to remove the contaminated materials from the site.

If you have any questions regarding this letter, or if we can be of any further assistance to you, please do not hesitate to contact us.

Yours very truly,

SOIL TESTING SERVICES OF MINNESOTA, INC.

William C. Kwasny, P.E.

President

Foundation Borings and Testing





SOIL TESTING SERVICES OF MINNESOTA. INC.

SUITE 280

2405 ANNAPOLIS LANE MINNEAPOLIS, MINNESOTA 55441 PHONE 612-559-1900

August 16, 1978

Miller, Hanson, Westerbeck, Bell Architects, Inc. 100 North 6th Street Minneapolis, Minnesota 55403

Attention: Mr. Ed Bell

STS Job Number 90920-B

Design of underfloor gas venting system for the Oak Park Village Development in St. Louis Park, Minnesota

Gentlemen:

We are enclosing recommended design schemes for the vent system for buildings I and 2 for this development. This is in accordance with the modifications we discussed in our letter of July 7, 1978.

The writer visited with Mr. Harlan Schrupp on August 16, 1978. The recommended vent systems detailed herein were presented by Mr. Schrupp, and we concur that they are feasible for use on the project.

In summary, we recommend that a PVC gas' venting pipe be directed into each cell comprised of the floor slab and a grade beam, where the cells have at least one wall on the outside of the structure. As you can see, the design details of this are relatively simple consisting of a length of PVC pipe extending back under the floor slab a distance of 5 feet. Please note that we have recommended that the thickness of the granular blanket be reduced to six inches, as opposed to the original design which called for twelve inches. The pipe would then be vented through the side of the building directly above the exterior grade. In order to cover the vent locations, a hood or shroud, similar to those used for yenting of gas dryers, can be used. Such a hood can be painted or treated so as to blend rather inconspicuously with the structure.

In building number 1, where there are some cells isolated within the interior of the building between grade beams, interconnection of the cells to an exterior cell can be made by placing a piece of 2 inch PVC pipe over the grade beam cast within the floor slab. We are of the opinion that this would not structurally alter the floor slab strength, while still providing adequate venting.

Miller, Hanson, Westerbeck, Bell Architects, Inc. Page 2 August 16, 1978

If you have any questions regarding this letter, or if we can be of any further assistance to you, please do not hesitate to contact us.

Yours very truly,

SOIL TESTING SERVICES OF MINNESOTA, INC.

William C. Kwasny

Registered Professional Engineer, Minnesota

Enclosures

WCK/jag